THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXXII. No. 1847.] LONDON, OCTOBER 4, 1898. [50TH YEAR. PRICE 6d.

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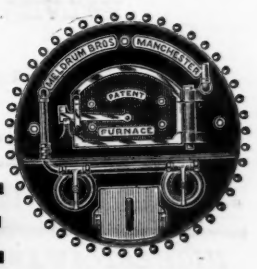

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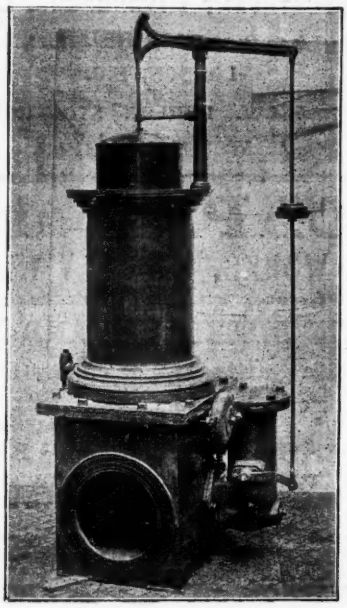

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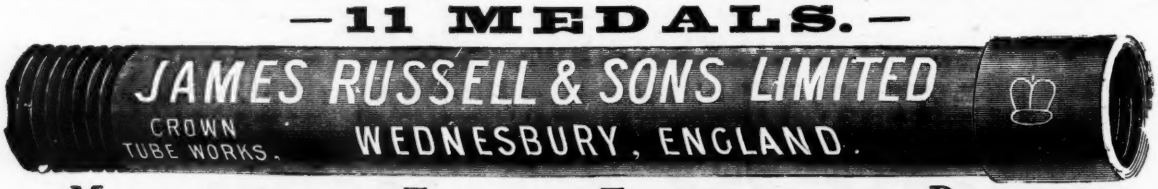

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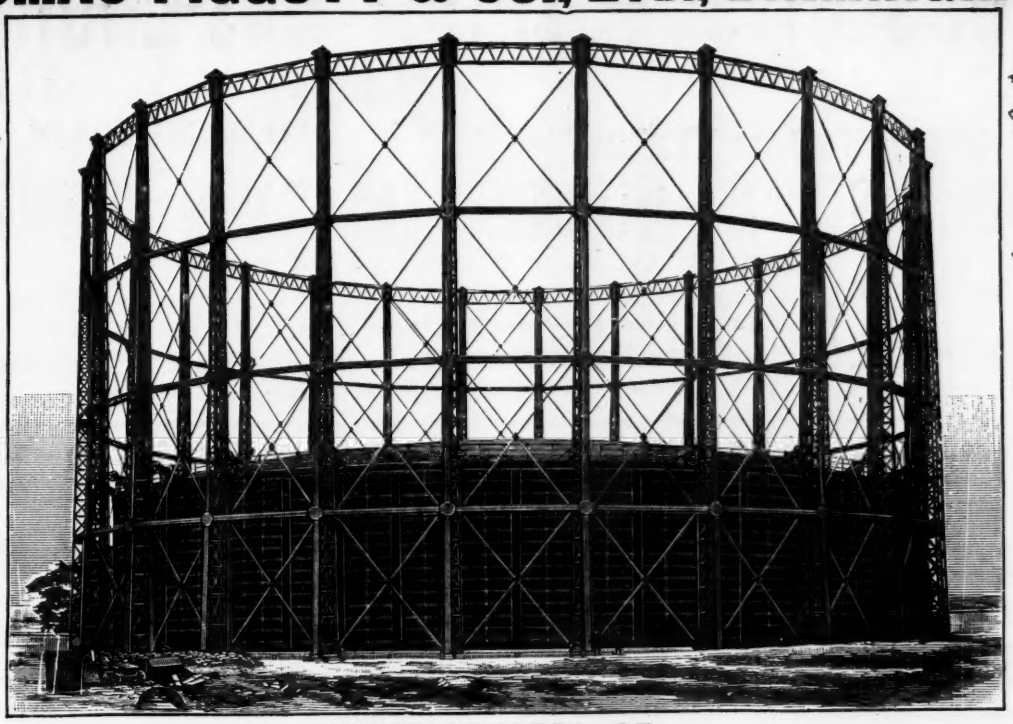

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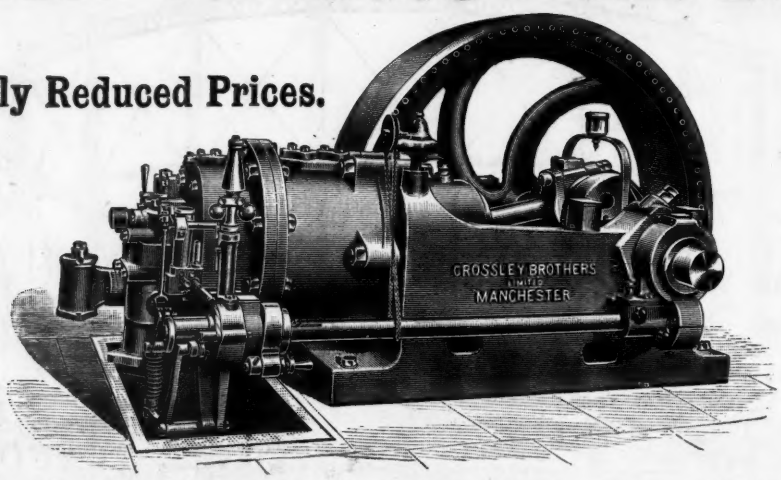

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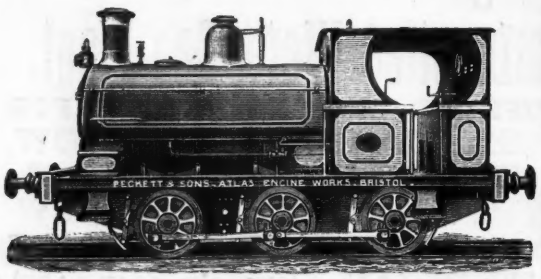

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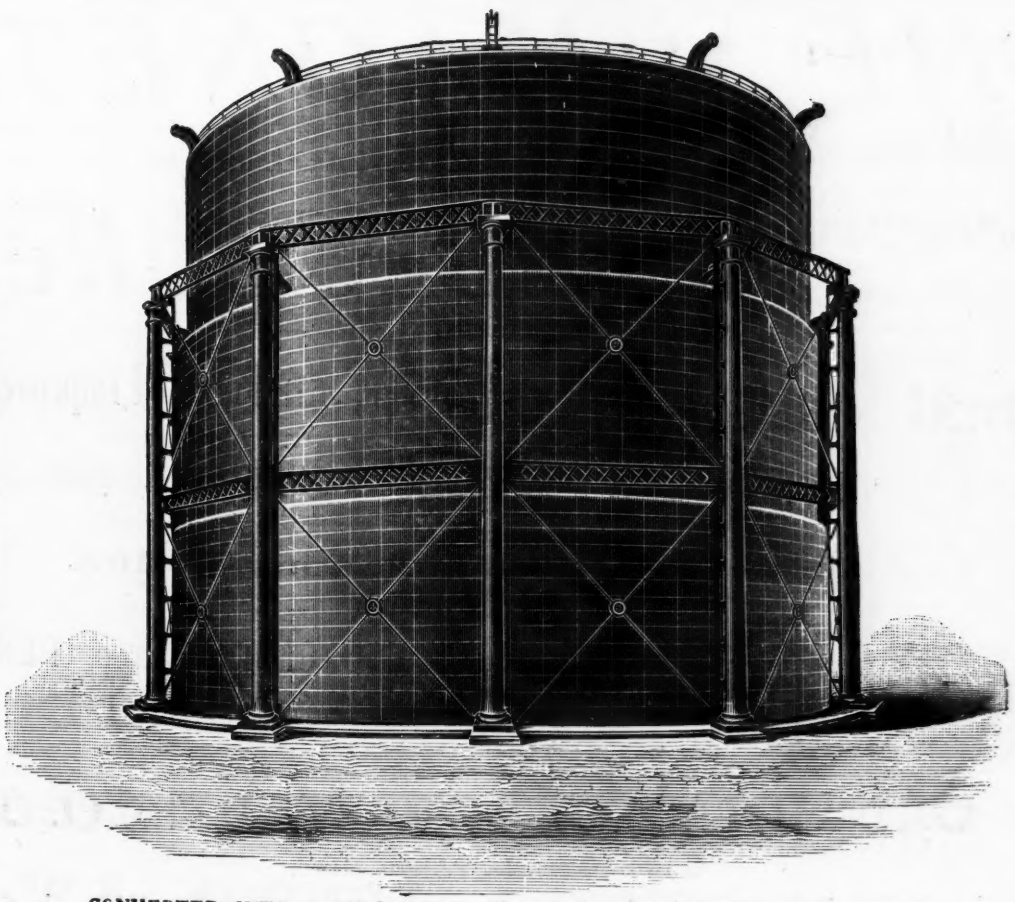

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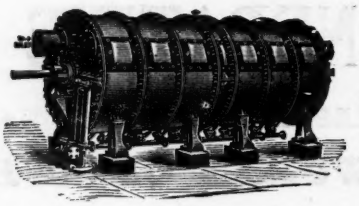

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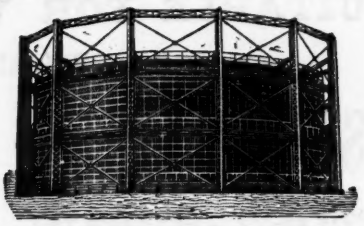

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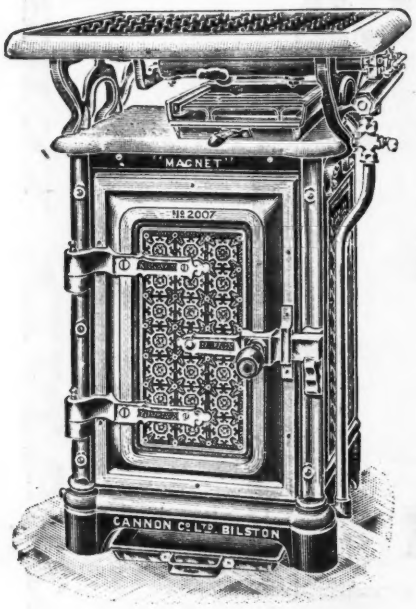

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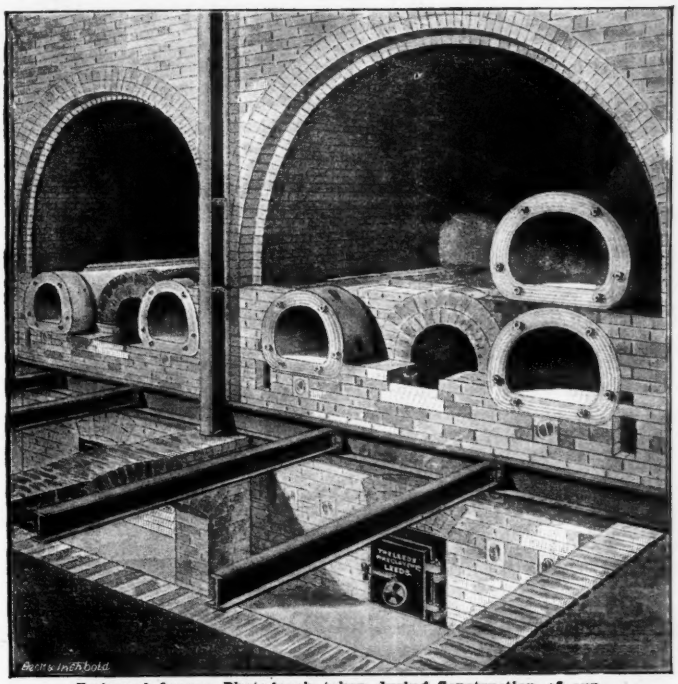

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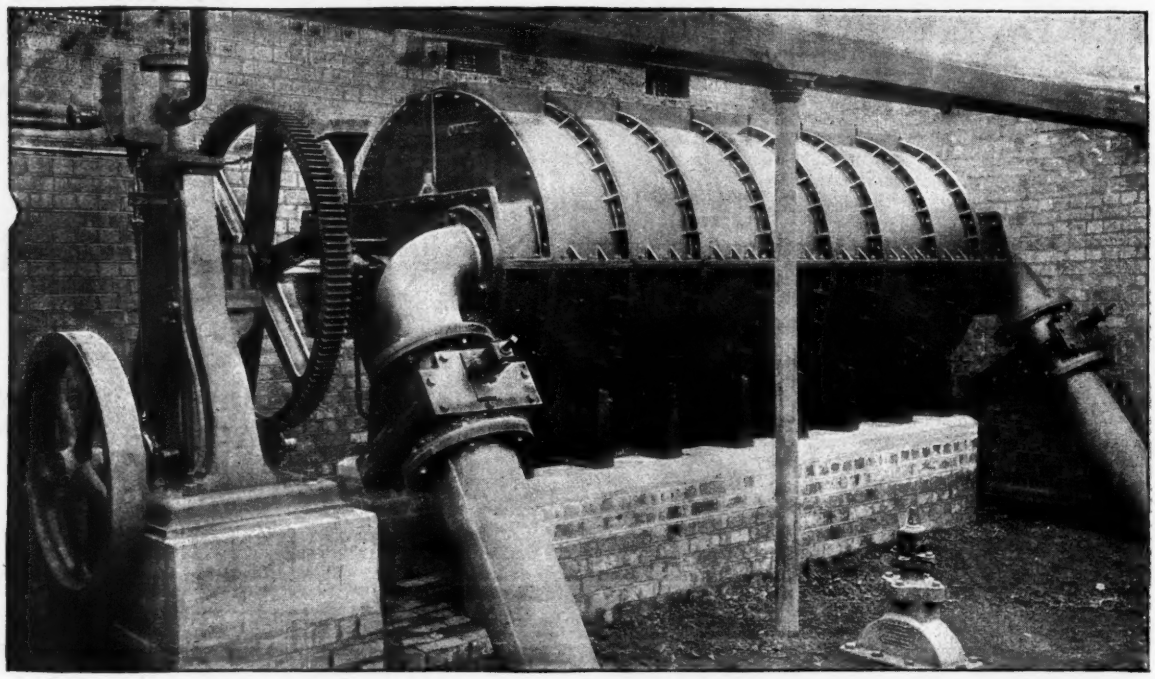

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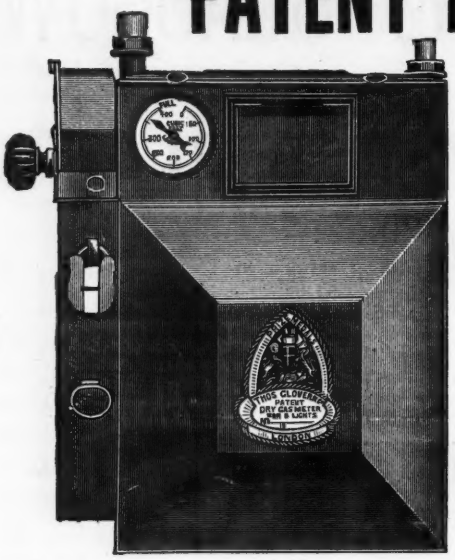

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TO CORRESPONDENTS.

No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

EDITORIAL NOTES.

Lights for the Winter—Gas Ahead!

WITH the approach of winter, the subject of artificial lighting for the long evenings assumes importance; and it may well occur to the gas engineer and manager to ask whether matters have materially changed in this respect since last spring relegated the question of domestic and street lights and lighting to comparative insignificance. The first result of a glance over the whole field covered by this question is the assurance that things are very much as they were in this regard—with the exception that gas is once more well to the front. Lest we should be accused of partiality in making this declaration—of indulgence without excuse in the cry, "There's nothing like leather!"—let us remind our readers of one or two facts. The only novelty in artificial lights that has come to the front during the past summer is the new Welsbach burner. There can be no question about this significant circumstance. It is not, of course, that the whole future of gas lighting is bound up with the development of the Welsbach method of burning gas for the purpose of giving light; but the fact remains that, apart from this, there is no advance to record. Flat-flame gas-burners still have their field of usefulness; and a very wide one it is. Argand gas-burners retain their friends; and the regenerative gas-lamp is as good as ever it was. But these things hold their old positions. They do not advance in any direction. They have touched the high-water mark of efficiency and of public favour; and beyond it they do not offer to pass. With the incandescent gas-burner it is different. The capability of the system has displayed unsuspected elasticity; and he would be a bold man who should say that the ultimate possibilities of the principle have been realized, or even indicated.

Meanwhile, what have the electricians been doing to improve their lamps? Nothing at all. This may seem a hard saying; but we have searched their own recent advertisements in vain to find any allusion to the securing of a better lighting effect. The arc and incandescent lamps offered by electricians are practically the same, and give the same duty as they have done these years past. There is at the present moment an Electricity Exhibition open in Turin. This is the second of its kind to be held in the same city; the first having been in 1884, when the famous Gaulard and Gibbs transformer was new to the world. Now the question of transformers and "phase" is still occupying the attention of electricians; but there are no new lamps. When the enterprising electrician is not engaged in contemplating the engrossing topic of "phase," or preoccupied with "boosters," or "rectifiers," he loves apparently "to lie a-basking in the sun." At any rate, he cannot gain very much comfort from the study of electric lamps with the object of getting a better duty from them. Similarly, the petroleum lamp interest is "marking time." We learn from the "Ironmonger" that "it is stated in "some quarters, with much foreboding, that the best days "of the oil-lamp trade have passed away. To some extent "there is truth in the statement." Lamp makers do not advance. They busy themselves over small variations of detail and pattern of stand and shade; but "there is, in "the aggregate, a marked absence of originality in the "burners." It is long since a really new oil-lamp flashed upon the market. Lamp sellers and users discuss the comparative merits of metal and glass containers, the gauging of wicks and their tubes, and so forth; but essentially the type of the oil-lamp remains fixed. The incandescent oil-lamp seems to have failed to "catch on," for some hitherto unpublished reason. The very fact of there being a cry in the lamp trade for the standardizing of burner-fittings is a sign that no advance is regarded as possible in this direction. All this is encouraging to the partisan of gas for lighting, to say nothing, for the present, of other purposes. His is the one progressive illuminant; and it will be his own fault if he fails to benefit from this great advantage.

The Morley Arbitration.

THE Morley gas arbitration took place last week under the presidency of Mr. James Mansergh, sitting as Umpire, with Mr. Thomas Newbigging as Arbitrator for the Company, and Mr. Corbet Woodall filling a like office for the Corporation. The arbitration was held under the terms

of the Morley Corporation Gas Act of this year, according to which it was to be governed by the provisions of the Lands Clauses Acts "with reference to the purchase and "taking of lands otherwise than by agreement." It is also provided that, in ascertaining the amount of the purchase-money to be paid by the Corporation for the Gas Company's property, due allowance shall be made for the reasonable expense of re-investment. Other considerations affecting the price of the undertaking are stated in the Act. Mr. Pember, Q.C., was leading Counsel for the Gas Company; and his "string" of experts included Mr. E. H. Stevenson, Mr. W. R. Chester, and Mr. R. Porter. Mr. Balfour Browne, Q.C., was for the Corporation, advised by Mr. Charles Hunt and Mr. W. A. Valon. The valuation of the property was intended to be upon a liberal scale; and the Company asked through their Counsel for 30·77 years' purchase of the maintainable profit, with 10 per cent. added for compulsory purchase. The amount of the maintainable profit was taken to be £4078. After all additions and deductions had been duly made, including 2½ per cent. for re-investment, the gross valuation of the undertaking came out at £133,688. The share capital of the Company is £46,100, upon which last year's dividend amounted to £3380. There are no arrears of dividend; the works are in excess of present requirements, albeit of an old-fashioned type; and there is plenty of land. The price of gas is only 2s. 4d. per 1000 cubic feet; and the district has been well served by the Company, who, on the other hand, have been prosperous from the commencement of their existence. An interesting feature of the proceedings was the application made of the statutory direction to allow for the cost of re-investment. The witness who dealt with this matter —a Leeds stockbroker—showed that it would probably take three months to wind up the Company and distribute the money, during which time the shareholders would be standing out of their customary income from the investment. Then six weeks should be allowed for finding a fresh investment; so altogether 2½ per cent. upon the value was the figure arrived at as representing this allowance. The case put forward by Mr. Balfour Browne was merely a pulling to pieces of the valuation submitted by his learned friend on the other side. This being a maximum dividend Company, everything beyond the full dividend and the reserve fund belongs to the consumers. With regard to the number of years' purchase, it was suggested that 25 should be the proper multiple of the maintainable profit, which did not come out so high as had been stated. All sorts of things required to be done to the works; and there was no justification for the proposed 10 per cent. allowance for the compulsory purchase. Besides, 2½ per cent. is a ridiculously high charge for re-investment! The Corporation experts valued the undertaking at a little less than £80,000. The difference between the two valuations is thus very considerable. Upon the case as it stands, however, the Arbitrators will not experience much difficulty in striking a fair mean. It is not for us to anticipate the issue, of course; but we shall return to the subject when the award is published.

The Report and Accounts of the Commercial Gas Company.

THE report of the Directors and the accounts of the Commercial Gas Company for the past half year have been issued. The ordinary general meeting of the Company will be held on Thursday next. A profit of £53,958 has been earned on the half-year's working. Deducting interest on debenture stock and loan, there remains standing to the credit of the net revenue account a balance of £49,189. The Directors recommend the declaration of a dividend at the rate of 13½ per cent. per annum on the old stock, and of 10½ per cent. per annum on the new stock. The capital account being again considerably overdrawn, the proprietors will be asked to sanction another new issue. The expenditure upon prepayment meters seems to be slacking off a little. The receipts on revenue account show a fair increase, due to a larger gas-rental; residuals having fallen off slightly. On the other hand, working expenses have been less. Coals cost £70,588, as compared with £72,011; and carbonizing wages actually fell from £21,126 to £18,300. This is a most satisfactory sign. The net result is to increase the profit balance from £47,227 to £53,958. The management is to be congratulated upon this evidence of its quality. The other entries of the accounts do not call for special comment. The undertaking is manifestly prospering; but it will be interesting to hear what the Chairman has to say concerning the price of coal in respect of the immediate future. Rumour has it that the Company had to pay pretty smartly for their year's supply; but, of course, rumour may not be reliable.

The Affairs of the British Gaslight Company.

THE meeting of the British Gaslight Company, which we report elsewhere, is interesting on several accounts. Being the sole surviving representative of an order of Gas Companies that in their day were instrumental in carrying light into various dark places in the land, this time-honoured and honourable Company must always attract a degree of sympathetic attention so long as it exists. It would be impossible to maintain, however, that the system represented by the Company has always been justified, even in their own case. The instance of the Norwich undertaking sets off that of the Hull concern. The public of the different towns served by the Company have no reason to complain of the system, so far as it works out in the price of gas; but the Company themselves are not equally happy everywhere. At Hull, they seem to be on the best of terms with everybody; and no system could supply the Potteries with cheaper gas. But Norwich is a troublesome customer. The Company's experience here illustrates the question as to the expediency of giving discounts upon gas accounts. The nominal price of gas was 3s. 6d. per 1000 cubic feet. This was the figure that stuck in the people's mind; and they never thought of the discount. The Directors have now cut the price down to 3s. per 1000 cubic feet, in the endeavour to reconquer their lost ground. Other steps have been taken to the same end; and the profession in general will wish the new management, in the person of Mr. John Young, every success. There is one source of trouble at Norwich that merits special notice, as it is of a very exceptional and instructive character. This is the enormous amount of the local rating, which has now attained the startling figure of 8s. 8d. in the pound. Curiously enough, this very subject of the heavy rates of Norwich is singled out for mention in "The Times" abstract of the last report of the Local Government Board. The observations of the Inspector of the Board for the Eastern Counties are a lesson in political economy deserving of being taken to heart everywhere. It is upon the question of pauperism. In Ipswich, the Inspector says, there is the one Union in this part of the country which administers the Poor Law under a code of sensible rules which are rigidly adhered to. "The result is, not only that its "pauperism is lower than in any other district of the "Eastern Counties, but the working classes are thrifty "and independent. In Norwich, on the other hand, "where the enormous funds of old charities have for "generations led people into the habit of depending on "doles, and where the Guardians give relief freely without "asking inconvenient questions, pauperism abounds, and "the poor-rate is naturally high." The British Gas Company are now suffering from the consequences of the undiscriminating almsgiving that stood for piety in the past.

The Dublin Gas Company—Retirement of Mr. W. F. Cotton.

THE meeting of the Alliance and Dublin Consumers' Gas Company, on Friday last, was signalized by an important change in the internal economy of the Company. Mr. C. Lawler, J.P., the Chairman, presided; and the Directors' report and statement of accounts, referred to in last week's "JOURNAL," were received and adopted. Their contents do not need to be discussed at length. They go to show that gas is holding its own in the Irish capital, and that the people of Dublin are beginning to awake to a better sense of the value of gas as a cooking agent. Dublin is a most conservative city, as regards the social arrangements of the population; and the householders are not prone to take up with new aids to the performance of domestic tasks. Still, gas is going rather better in Dublin than ever before. The chief event of the meeting was the fact that Mr. W. F. Cotton appeared for the last time as the Secretary and Manager. It is unnecessary to recount here the claims of Mr. Cotton upon the proprietors of the Dublin Gas Company. A quarter of a century ago the Company were in low water. Fortunately, the Directors of that day recognized the fact that they wanted a man to help them out of their trouble; and, more fortunately, they knew where to go for him. Mr. Cotton took charge of the undertaking; and under his care it slowly but surely began to mend.

Mr. Cotton's wisdom, patience, business capacity, integrity, and knowledge of his people, both inside and outside the Company, have stood the undertaking in good stead more frequently than he himself knows. Now he is to retire, but not wholly from the service of the Company. Relieved from the routine and detail work of the office, Mr. Cotton joins the Board in the capacity of Managing-Director; receiving an allowance equal to his full salary, and being succeeded in his old position by his son. It is a fitting conclusion of a worthy career pursued in one of the most trying posts in the whole range of the gas industry of Great Britain. We congratulate both the Dublin Gas Company and Mr. Cotton, and hope he may long live to advise the administration of the great undertaking he has served so long and so well.

The North of England Meeting.

THE meeting of the North of England Gas Managers' Association at Sunderland last Saturday was of a quality which gives the best possible contradiction to the oft-repeated remark that nowadays, with so many Association meetings, it is difficult to find anything that is worth saying. A man who has the command of his mother tongue, and an idea in his head, will give utterance to the idea; and people will listen to, and be benefited by, it. This remark is the most obvious comment which can be made upon Mr. Charles Dru Drury's broad and statesmanlike Presidential Address. The topics dealt with were numerous; but upon each of them there was shown a comprehensive and far-reaching grasp of mind, based upon, it must be inferred, active observation and experience. There follows, as a further illustration of the continuing utility of District Associations, the statement contained in the report by the Hon. Secretary as to what has been accomplished in the matter of insurance under the Workmen's Compensation Act. It was only in April last that Mr. T. Bower, of West Hartlepool, introduced the subject to the Association. At that time the rates quoted were as high as 25s. per cent. The Association took action; and Mr. Penney was able to report that, in their district alone, through the instrumentality of their Committee, about forty insurances of wages amounting to £125,000 had been effected at 9s. 6d. per cent. This result is an object-lesson which is not likely to be lost in connection with other subjects where united action would be beneficial. There remains to be noticed the paper by Mr. J. Holliday, of Scarborough, upon "The "Policy of Discounts." The paper (read in the author's absence) was found to be an excellent medium for the raising of a stirring discussion upon a subject on which, as would appear, opinions are strongly divided, and practice is more varied than could have been supposed.

End of the Coal "Crisis."

IT is with unmixed satisfaction we record the peaceful issue of the so-called coal trade "crisis," which occupied so much of our attention last week. Threatening as the aspect of affairs was for the moment, we did not believe there was any real prospect of a suspension of output in the Federation districts; and the event has justified this expectation. A conference of delegates, held in Westminster on Thursday, was able to record the fact of the acceptance—by a large majority—of the terms offered by the employers on July 6, and endorsed by the Union leaders. Thus the stake played for by the latter, as described in this column last week, was won. Yorkshire fell into line, and the threatened strike faded away. At the adjourned conference of coalowners and miners' delegates, presided over by Mr. A. Hewlett, the gratifying announcement was made that the latter were authorized to accept the terms of July 6. A request was preferred that the settlement should be enlarged to include the surface men; and this point was gracefully conceded.

This is all very fine; and the parties are to be congratulated upon their mutually satisfactory bargain. But there is something else to be said from the side of the coal purchaser. We remarked last week upon the existence of a rumour that the whole dispute was a "put up" thing, as between the coalowners and their hands, with a view to getting a higher price for the coal. According to the "Daily Chronicle" of Tuesday last, this is really the secret of the whole business. It is averred that the employers gave a hint to the men's leaders to threaten to put the screw on, in order that more favourable contracts might be made with Railway and Gas Companies. "To "a certain extent, this has happened." A pretty bit of business, truly, if the tale is true! The story is "queered" partly by the circumstance that the very largest gas and railway coal contracts do not, as a rule, go to the Federation districts; but still the fact that two out of the three London Gas Companies were caught, and made to pay a heavy advance on their coal contracts for the year, lends colour to the tale. There is something disquieting in the idea of the coalowners and miners' leaders plotting together to get a rise out of the unwieldy Gas Companies. It is so easy to do this, with some of them. A suspicion of this character, when once aroused, is difficult to remove. If nine coalowners out of ten were to come forward and swear by all their gods that they never, never did anything of the kind, the tenth would be held to prove the allegation by his abstention; while if all of them agreed, their unanimity would be regarded as giving them away. 'Tis a wicked world!

The Workmen's Compensation Act—Mr. John Aird's Point.

IT appears that the point of law raised by the Liverpool County Court Judge in connection with the award under the Act of compensation to the legal representative of a workman, and commented upon by Mr. John Aird, is not to be finally disposed of as summarily as this gentleman supposed in the communication to which we referred last week. It has since been pointed out that Mr. Aird's quotation from the Chancellor of the Exchequer only goes to show that the Board of Inland Revenue do not require probate or letters of administration "so far as they are concerned." The immediate question in the Liverpool case, however, was as to who was the "legal personal representative" of the deceased; and it was the responsibility for defining this claim that the County Court Judge declined. The true legal claimant can only be constituted by grant of probate or letters of administration. If the County Court Judge were to accept the unsupported claim of the first applicant, there would be nothing to prevent a second plaintiff turning up, who might prove to be the real personal representative of the deceased, and might in this capacity obtain a second verdict against the unfortunate employer. The point really means that proof must be given as to the legality of the claimant's position. Administration must be taken out, not with a view to payment of duty, but for the purpose of constituting a legal personal representative of the deceased, who alone can give a reliable receipt for the compensation payable in case of fatal accident. Consequently, solicitors advise that administration should always be taken out in such cases. It can be done by personal application to the local Inland Revenue Officer, at a cost of 15s. for fees and expenses; and employers should insist upon it for their own protection.

WATER AND SANITARY AFFAIRS.

EAST LONDON members of Parliament very likely think to render themselves peculiarly popular with their constituents by advocating a remission in the charge for water in proportion to a deficiency in the supply. Mr. H. S. Samuel, member for Limehouse, informs his District Board that he has waited on one of the Whips of the Conservative party, and told him that unless the Government introduce a Bill embodying the principle that people shall not pay for water they do not receive, he will bring forward such a Bill himself. Mr. Samuel must know very well that the Government will not take any such step as that which he proposes, but will leave him to make himself ridiculous if he chooses to do so. This gentleman is also anxious that a test case should be tried, in order to see how far the East London Company are right in making a full charge; and he is willing to guarantee the expenses of any such action which any Limehouse consumer may bring forward. Mr. Samuel need neither trouble nor tax himself. Mr. Chaplin's Act of last year provides a sufficient remedy for any consumer who feels himself aggrieved. A local authority may assist a complainant consumer in getting a settlement of his grievance, and the Court may award him damages. But wherein can the East London Company be said to have failed in their statutory duty? They are not only exempt on account of the extraordinary drought, but they have sent from their works a sufficient supply of water if each consumer had only possessed means for storing it. It is true they have not maintained a constant service; but the supply per head has been ample, and a delivery for four hours per day is as much as the City, which is served by

the New River Company, generally receives. Some years ago, as stated by Dr. Sedgwick Saunders, the supply to the City was only for one hour per day. The present failure at the East-end is in cisterns rather than in water. As to the intentions of the London County Council for the future of the Metropolitan Water Supply, nothing appears on the *agenda* for to-day, when the first Council meeting takes place after the summer recess, except a couple of notices of motion comprehending an attempt to obtain legislation on the subject in the coming session, and the bringing of a new supply from Wales.

The report by Major-General Scott on the Metropolitan Water Supply of 1897, contained in the annual report of the Local Government Board, issued last Thursday, while repeating much that has been said before, does so to good purpose, and gives the public the benefit of trustworthy data. Respecting the sufficiency of the Thames for the demands made upon it, the Board's report, founded on that by General Scott, is perhaps a little misleading. It states that, on the completion of the works sanctioned under the Staines Reservoirs Act of 1896, the quantity of water which may be withdrawn from the Thames in 24 hours will be increased to 305½ million gallons. It should be understood, as shown by General Scott, that this is the quantity which may be abstracted "in any given day;" the average being 185½ million gallons, or at the utmost, after allowing for certain exceptional cases of extra draught, decidedly less than 200 million gallons. In fact, General Scott puts the lesser amount as the quantity of water "which may be delivered daily." In the 305½ million gallons there is included an abstraction of 100 million gallons by the Southwark and Vauxhall Water Company, and of a like quantity by the Staines Reservoirs Committee. Much of this, therefore, besides being limited to the abstraction for "a given day," lies in the future; and how the case stands at the present time may be judged by the circumstance that the monthly returns for last year show the largest daily average as occurring in the month of July, when it was 128·6 million gallons. Last July the daily average was 130·3 million gallons. In August, 1897, the natural flow of the Thames was particularly low; being only 518·3 million gallons per day. Of the latter amount the quantity withdrawn for the Metropolitan supply was 23·5 per cent. But in February the abstraction was only 2·8 per cent. The natural flow of the Thames at Teddington Weir—that is to say, the observed quantity *plus* what has previously been taken out by the Water Companies—has been known to vary from 252 to over 5000 million gallons per day. These extreme variations point to the necessity of large storage reservoirs, so as to secure an abundant reserve to meet coming exigencies. The average flow of the Thames is abundant; but the minimum flow is apt to become very small in comparison. Great weight attaches to the remark by General Scott that if reservoirs were constructed on a large scale for the purpose of impounding the river water during freshets (a remedy which is really being adopted), the influence of the minimum or dry-weather flow of the Thames "as a factor limiting the capacity of the river for "the supply of the Metropolis would be to a considerable "extent eliminated."

These considerations, and some others which arise out of General Scott's report, need to be kept in view at a time when there is a tendency to disparage the conclusions arrived at by the Royal Commission under Lord Balfour. Lord Farrer's letter which appeared in "The Times" last Wednesday, stands in relation to this part of the water supply controversy. His Lordship dwelt especially on the future of the Lea; but he also suggested that we may be approaching in the valley of the Thames the same conditions which already prevail in the other valley. "If "there is the least fear of this," it is argued that action should be taken at once to secure some unappropriated area—evidently at a distance—which shall furnish a supply for the Metropolis. But Lord Farrer, and others who take the alarmist view, would be nearer the mark if they were to show, as General Scott does, that the immediate question is not so much one relating to a new source, as to the construction of proper works. The average flow of the rivers and the yield of the wells being far beyond any possible requirement for a long period of time to come, the actual need is that of storage. It is a curious coincidence that the recent distress in East London has not been due so much to failure of the supply as to lack of storage. The domestic cistern is founded on the same principle as the Company's reservoir. To store the water when it is to be had is to provide against the period of scarcity, whether it be hours or months. General Scott mentions that the East London Company have almost doubled the storage capacity of their works by completing the reservoirs provided for in their Act of 1894. Even more than this is needed "in order to provide for the im-"mediate future." But it is signified that the Company "have obtained statutory powers which will enable them "to undertake this work." The fact that the volume of discharge of the River Lea "during periods of drought "falls far below the requirements of the population of East "London in the matter of water supply," emphasizes the demand for reservoirs—a demand which it is only fair to say is being met. The New River Company are also constructing works which will give them an ample supply from the Thames.

The intensity of the recent drought is really shown by a variety of facts; and it is difficult to find anything equal to it in the past, unless at some remote date. The earth has been so baked that where the clay formation is at the surface the soil has in some cases become contracted to such a degree as to injure superincumbent buildings. Instances of this nature are reported from various parts of Hertfordshire, especially in those near London. In Essex and Mid-Kent the villagers have been greatly distressed by the drying up of wells and streams. Other parts of the country are found in similar straits. As mentioned by Mr. Chaplin, in his reply to the recent deputation, municipal authorities are not exempt from difficulties in regard to their water supply, of which Birmingham furnishes a notable example. The capital of the Midlands, where the water-works are the property of the Corporation, is even in a more precarious state with regard to its supply than that which lately befel the East-end of London. Towards the close of last week, one of the two principal reservoirs at the Birmingham water-works was absolutely dry, although capable of holding about 20 million gallons of water. The great Shustoke reservoir, having a storage capacity of 400 million gallons, was more than half empty. The River Bourne, which should feed that reservoir, is described as having become "little more than a trickling "ditch." The sum total of the situation is that, of the 19 to 20 million gallons per day now given out, only 8 million gallons are yielded by the streams, the flow of these being greatly reduced. The deep wells give some 6½ million gallons daily; but it is feared that this cannot be fully maintained. There remain about 5 million gallons per day to be drawn from the storage. The danger which most forcibly presents itself is that of an early frost, by which the inflow will be arrested; leaving a half-exhausted reservoir—of itself in its present state, only equal to ten days' supply—as the sole aid to the wells. In order to keep up the reserve, an earnest appeal has been made to the people of Birmingham to economize their use of water, but apparently without effect. The constant service is continued, and it is known that the consumption is more than it need be. There is a supply to come from Wales, but it will be four years before the works can be completed; and it is urged that Birmingham consumers must be careful not to waste any of their supply pending the opening of the aqueduct. The entire case shows that even municipal wisdom may be baffled by the exigencies of the water supply as affected by phenomenal weather.

Society of Engineers.—At the meeting of this Society at the Royal United Service Institution, Whitehall, last night, Mr. Sherard Cowper-Coles read a paper on "Protective Metallic Coatings for Iron and Steel."

Artesian Wells in Paris.—We learn from the "Builder" that the Municipal Engineers of Paris have just completed the piercing of the artesian well at Buttes-aux-Cailles, commenced in 1864 by MM. Dru, and finished by M. Cerrault, who has had charge of the work since 1872, and has encountered unexpected difficulties which have delayed its completion. This is the fourth of the important artesian wells in Paris, all of which give a full flow of water. The first one to be sunk was that at Grenelle, commenced in 1833, and completed in 1841. Its depth is 1797 feet. The second was commenced at Passy in September, 1855, and completed in September, 1860. The boring passed through the chalk formation, and tapped the greensand at a depth of about 1920 feet. The third was started in the Place Hébert in 1863, and, after an interruption of the works, was continued till a depth of 2355 feet had been reached. The cost of this well was rather more than £80,000.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 768.)

LAST week opened on the Stock Exchange still burdened with the weight of depression which marked the close of its predecessor. Anxiety concerning the state of political unrest, and the possibility of more trouble in the coal-fields, had a very unfavourable tendency. But by mid-week more hopeful views prevailed; and this, in conjunction with the colliers' decision to accept the masters' terms, relieved the position, and so things continued to the close. Business, however, was at no time brisk; and prices were not largely affected. This was partly owing to its being account week, and partly to the condition of the Money Market, where there was a very strong demand both for Stock Exchange purposes and other requirements incidental to the close of the quarter. Discount rates however eased off as the run on gold slackened. In the Gas Market, business was extraordinarily quiet—indeed, it is questionable whether we have ever had to note a week in which there were so few transactions marked. It has thus been an uneventful period; but it is satisfactory to observe that, notwithstanding the stagnation, prices did not droop as they very frequently will when they receive no support. In fact, changes of quotation, though few in number and slight in degree, are all for the better. In Gaslights, the "A" was occasionally dealt in at the old figures, ranging from 292½ to 295½, and showing no move. But in the secured issues, a parcel of the 10 per cents was taken at a good price; and the quotation advanced a couple of points. South Metropolitan ruled easy at first, and seemed inclined to drop; but the closing mark was better. One deal in the debenture was all that was done in Commercial. The issue of the Company's accounts completes the history of the Metropolitan undertakings to Midsummer, and shows that the Company have earned their dividend, as well as a nice balance to carry forward. The Suburban and Provincial undertakings were quite quiet and unchanged. At the British Company's meeting on Wednesday, the reduction of the dividend to a 10 per cent. rate was approved. The Continental Companies were as quiet as the rest; but Imperial pushed up another two points. Among the rest, Melbourne, Ottoman, and Cape Town profited by *ex div.* changes. The Water Companies were fairly animated, considering the general torpor. The tendency was decidedly good, and quotations advanced—East London making a further recovery.

The daily operations were too small for detailed notice. On Monday and Tuesday there were only about a dozen transactions in Gas; and on Wednesday only two, and quotations did not move. But in Water on Wednesday, East London rose 3; Kent, 1; Southwark ordinary, 1; and ditto "D," 3. There was still nothing doing in Gas on Thursday; but in Water Southwark ordinary gained 1. Gas was nearly stagnant on Friday; but Imperial moved up 2. On Saturday, the only feature was a rise of 2 in Gaslight 10 per cent. preference.

ELECTRIC LIGHTING MEMORANDA.

The Development of Electric Tramway Working in London—A False Start—A Fair Offer—The Objection to the Trolley-Wire System.

A SMALL crisis appears to have arrived in respect of the development of electric traction for tramway working in London. The London United Tramways Company have addressed an appeal to the London County Council for permission to apply the overhead trolley system on three short lengths of the Company's lines which lie within the area controlled by the Council. Parliament last session granted powers to the Company to work the greater portion of their mileage by electricity; but, in view of the opposition hitherto offered by the Council to the trolley-wire system, the end portions of the lines that entered the County Council area were left out of the Bill. Accordingly, while 22 route-miles of tramway stretching away to the western outskirts of the Metropolis may be worked electrically, the inner 4 miles must continue to be worked by horses, unless the County County yield to the prayer of the Company and allow them to do by grace what they have no power to do by law. The course taken by the Tramway Company in this affair strikes us as being more cunning than clever; and we doubt very much if it will prevail with the County Council. Afraid to meet the Council before the impartial tribunal of a Parliamentary Committee, the Company drove not only the thin end, but almost the whole of their "wedge" of electric traction into their system. Now they want the Council to stand aside and let them finish the job. If the Council object, it will be sought by the Company to cast upon this much-abused body the odium of what will be represented as a standing in the way of real "progress." Indeed, this has already been done. The Tramway Company have tuned that highly respectable, impartial, and well-informed journal, the "Financial News" to sing a song whereof the burden is—see how the London County Council lags behind Middlesbrough and Stockton in furthering development of electric tramway working! Why, the Council is the most retrograde public body in the kingdom, because they have not succumbed to the charms of the overhead trolley wire!

This is not the way to approach the London County Council or any other self-respecting Local Authority. The less the financial press has to say in favour of electric traction, the better for its prospects in London and elsewhere. The very worst thing that could happen to the United Tramways Company's scheme would be for it to fall under suspicion of being pushed by the methods of financial journalism. Electric traction may be a good thing for the United Tramways Company and their public; but if so, Parliament should have been consulted as to the expediency of the opposition of the London County Council. To shirk this ordeal may have been prudent. Probably it was wise for the Company to shrink from antagonizing the County Council. It is scarcely wise, however, to attempt to get round the Council by taking advantage of a side-wind immediately after declining to face their opposition. Perhaps the appeal of the Tramways Company in this instance is not expected to succeed, but is only put forward "on the off-chance," so to speak, of finding the Council in a yielding mood. If it fails, then the Company will be in no worse case than they were before; while they will have given the County Council and the public to understand what they would wish to do if they could have their own way. This desire may or may not be altogether admirable. The public will have a means of judging between the Company and the County Council when the bulk of the Company's mileage is worked in the manner proposed. Not before.

Our contemporary the "Electrician" supports the Company; agreeing that disadvantage to the public will result if the Company are compelled to have three dead-ends to an otherwise through and complete electrical system worked by horse haulage, "in place of enjoying one unbroken mode of traction from end to end of the lines." This is just the point which the public may well be left to appreciate. On the face of it, there is no particular reason why the break between horse and electric traction should not occur in one place as well as at another. It is not as if this Tramways Company had the whole of London to deal with. Nobody proposes to hand over the central thoroughfares of the Metropolis to the joys of electric tramcar working by the trolley wire. This may be a source of pleasure to Stockton and Middlesbrough; but Ealing and Shoreditch will not be connected in this way yet awhile. Hence the best and most extensive western metropolitan electrical tramway must have an end inwards as well as outwards; and is there not enough scope for the trolley wire outside the County Council area, without troubling the latter body to reconsider their declared policy? Why not let the facts speak for themselves, when they are realized? It must not be overlooked that the Tram Company have made the County Council a handsome offer with a view to gaining consent to the scheme. The Company would be prepared to hand over to the Council, without charge, all the electric-line equipment which is outside the purview of the purchase clauses of the Tramways Act, 1870. They would further agree to remove the overhead equipment at a year's notice, if deemed undesirable, and would engage to substitute for the system any better mode of electric traction which may in future be commercially developed.

This is a better way of talking. The world may consent to endure the overhead trolley system of tramway working for want of something less unsightly and dangerous; but it is a reproach to modern electrical science, not a credit, that nothing of the kind is available. None but the most perfervid of enthusiasts for electric traction at all costs would consent, say, to Piccadilly Circus being delivered over to the overhead trolley system. In resisting the threatened encroachments of the system on the outskirts of the town, the London County Council are only acting consistently with the principle underlying the objection to its advance into Piccadilly Circus. They are waiting for something better; and until this appears, they are justified in protecting the region committed to their charge from unnecessary inroads. It is idle to throw names of other places at the London County Council, as though London were at all susceptible of being classed with any other city or town of the whole world as regards street traffic. Parliament, in its wisdom, has sanctioned a trial of electric traction below the central regions of the Metropolis, and away in the suburbs. Let it approve itself under these diverse conditions, before asking for further patronage. It is greatly to be desired, meanwhile, that some better system of working electric tramways than by the single overhead trolley could be perfected. Owners of gas and water mains in the thoroughfares marked out for "improvement" in this way cannot look without misgiving upon the prospect thus opened before them.

Municipal Engineering Classes at University College.—A new branch of the work at University College, London, has been started, with the support of the Chadwick Trustees, in connection with the teaching of municipal engineering. Mr. Osbert Chadwick, M.Inst.C.E., has been appointed first Professor; and Mr. M. T. Ormsby will be in charge of the drawing office. Special courses of lectures are to be delivered by Mr. R. E. Middleton and Professor Corfield, on "Water Supply, Sewerage, &c.," and on "Hygiene and Public Health." The Trustees have made a grant of £1000 to the College for increasing the laboratory equipment.

THE EVIL OF UNPROVED ASSUMPTIONS IN PHYSICAL SCIENCE.

THE liability of the human mind to bind itself with the shackles of preconceived ideas, is one of the humbling lessons of history. Time and again a retrospect of the development of some department of man's work in the past shows how much observance has been paid to imaginary conditions which had no justification in fact, and how persistently mankind has followed self-imposed rules which were absolutely groundless. Medical men of the present age are apt to exhibit impatience when reminded of the empirical practices of their predecessors in the art of healing—practices which were followed for centuries before the practitioners awoke to the fact that they had never cured anybody. The followers of Galen and Hippocrates, however, have not been the only self-styled men of science to become lapped in hoary tradition, to the exclusion of the light of truth. Every art and science has similarly suffered hindrance and limitation through the same evil. In his presidential address to the Mechanical Science Section of the British Association (see *ante*, p. 589), Sir J. Wolfe Barry made some instructive remarks upon the unfortunate influence exercised down to the present day upon engineering achievement by baseless theorizing and erroneous deduction from facts true enough so far as they go. His observations upon this head should be deeply pondered by all engineers.

The speaker began by referring to the history of the Great Western steamship. This was a new departure in the naval architecture and marine engineering of the day, and as such the enterprise of her designers met with much discouraging criticisms from "authorities" who presumed to know all about it. Foremost of these was the redoubtable Dr. Lardner, who at the meeting of the British Association in Bristol in 1836 made the public declaration that the whole idea of ocean navigation on voyages as long as from Bristol to New York was an "abstract impossibility." It can be easily imagined how difficult it must have been for the builders of the ship to go on with the work in face of such condemnation. As a matter of fact and of history, they did go on. The steamship was launched in 1837, sailed from Bristol in 1838, and arrived at New York, in fourteen days, with 200 tons of coal in her bunkers. It is like a breath of bracing air to hear such tales of the triumph of human daring and perseverance over the equally human evil of ignorance masking as complete knowledge. Those who are jealous of the fame of science in general, and of Dr. Lardner's reputation in particular, have sought to minimize the part played in this business by the eminent philosopher in question. Sir John Barry, however, will not have him or his science whitewashed in any such way. Dr. Lardner's views, hostile to the success of the first Atlantic steamship, were arrived at after calculation and reasoning, and were boldly and honestly enunciated by him. These conclusions were based on principles which he supposed to be sound, but which were, in fact, assumptions. The opposition between Lardner and Brunel was typical. Lardner believed that the resistance to the progress of a ship varied directly with her capacity; that a certain number of tons of coal were required per horse-power for the voyage across the Atlantic; and that, this being so, enough fuel could not be carried in a ship, however large she might be made. Brunel, on the other hand, contended that Lardner's views were fundamentally erroneous; for that, whereas the capacity of a ship increased in the ratio of the cube of her dimensions, the resistance to her progress varied not in the ratio of the cube, but nearly as the square of her capacity. Thus, by adopting a proper length, beam, and draught, a ship would not only carry coal for the journey to New York, but be commercially successful in respect of cargo and passengers. The event proved Brunel to be in the main right, although later science has shown that the speed and fuel consumption of steamships are dependent chiefly upon certain considerations of which he was necessarily ignorant.

Sir J. Barry's motive for raking up this old controversy was a desire to exhibit the danger of reasoning on unascertained premises. He went on to recount another instance that comes closer home to gas engineers—the unfounded assumptions with regard to wind pressure which have been used to condemn engineering structures of an extraordinary character, notably the Forth Bridge. When the design for the Forth Bridge had been selected by the Railway Companies who were to pay for it, and had passed the ordeal of a parliamentary inquiry, a most distinguished man of science (the then Astronomer Royal) promulgated the opinion that the proposed structure would be unsafe and ought not to be constructed, because the engineers had neglected certain laws which he enunciated respecting the resisting power of long struts to buckling. Taking the conventional value of wind pressure into account, Sir George Airy stated in a letter to a newspaper that "we may reasonably expect the destruction of the Forth Bridge in a lighter gale than that which destroyed the Tay Bridge." This was a most serious indictment; but it was, in point of fact, baseless. Another distinguished mathematician publicly criticized the Forth Bridge with equal vigour, "basing his views that it was fundamentally incorrect on another set of equally erroneous assumptions, maintaining again that it should not be permitted, because he proved by reasoning on these assumptions that it must be absolutely unsafe." This is pretty bad for the theorists and mathematicians; but Sir J. Barry goes on to show that it is not only the men of science who occasionally obstruct the advance of engineering. So-called practical men are equally prone to assert the existence of conditions which are purely imaginary. He cites the example of Mr. W. Froude and his experiments with ship models. Until these were begun "on the highly difficult and almost insoluble causes of the retardation of ships and their behaviour in waves—beginning at the beginning, taking nothing for granted, and eliminating all elements of possible errors—little or nothing was known of the laws governing these questions. Laws had been laid down by high authorities as to the causes of retardation of ships, many of which in fact were not true, while some of the assigned causes were non-existent, and some real causes were unrecognized." Mr. Froude was told that the behaviour of his models would never teach anything applicable to the moulding of full-sized ships; but he went on, and now it is the outcome of his *à priori* depreciated experiments which determines the shape of every ship in the Royal Navy and not a few in the Merchant Service.

Reverting to the question of wind pressure, of which so much was heard when the design of gasholders was in course of revision, ten years ago, Sir J. Barry discussed it as an example of "hasty generalization." The responsibility for this begins with Tredgold, who, sound engineer that he was, laid down in 1840 that a wind pressure of 40 lbs. per square foot should be provided for in calculating the strength of roofs. He reasoned, no doubt, from the fact that such a pressure had in this country been registered on a wind gauge of a square foot or less in area. As a consequence, and quite naturally, Tredgold assumed that the same force could be exerted by the wind on areas of any dimensions. He put the rule into his famous book; and thenceforward it became imperative to allow for a wind pressure of 40 lbs. per square foot of the whole exposed surface of a bridge, roof, or other structure similarly conditioned. In 1879 the Tay Bridge fell. Its piers had not probably been strong enough to resist a wind pressure sideways of one-fifth this amount. Sir J. Barry passed over the real cause of this deplorable mishap. It was sufficient for his purpose to cite the disaster as having instigated the Board of Trade to order in 1880 all railway bridges throughout the kingdom to be designed to resist 56 lbs. of horizontal wind pressure on their whole exposed areas, with the ordinary factors of safety for the materials employed, as if such horizontal strain were a working load. This order is still in force.

Meanwhile, it had long been suspected that these small-gauge experiments were untrustworthy. Experiments were instituted at the Forth Bridge on two wind gauges of 300 square feet and 1½ square feet respectively. These indicated that, with an increase of area, the pressure fell off in a very marked degree. Under the same conditions of wind and exposure, the larger gauge registered a pressure 38·7 per cent. less per square foot than the smaller gauge. Sir J. Barry has been able to carry the experiments further at the Tower Bridge, by observing the pressure on the surface of the bascules of the bridge as evidenced by the power exerted by the actuating engines. He said: "In this case we have a wind gauge of some 5000 feet in area, and it has been shown that, while small anemometers placed on the fixed parts of the bridge adjoining the bascules register from 6 to 9 lbs. per square foot, the wind pressure on the bascules is only from 1 to 1½ lbs. per square foot." This is an astonishing discovery. Sir J. Barry went on to remark that "it is difficult to imagine the amount of money which has been wasted in unnecessary provision against wind strains of 56 lbs. per square foot on large areas, in consequence of this hurried generalization from insufficient data." He knows something of what this provision cost at the Tower Bridge, and does not wish to mention it. Yet what can an engineer possibly do, when he has to get his plans passed?

The gas engineering world knows well what a tempestuous controversy, of any amount of "wind-power" in itself, was aroused by the suggestion to abolish or substantially modify the lofty framing of gasholders, for the reason that the conventional provision against wind-strain was extravagant. Every constructor who took part in this discussion had had Tredgold's 40-lb. rule rubbed into him from the day of his entrance into the drawing office, and most of them could not emancipate their ideas from it. Yet the truth was with the few who ventured to doubt the fact of any gasholder having been exposed to such an overturning pressure as that of 40 lbs. per square foot of its windward side. The application to gasholder guiding of the Pease wire-rope system has enabled direct measurement of the overturning pressure to be made; and this has been found to be far below what was expected. Engineers will heartily echo Sir J. Barry's declaration that "we should exert all our influence against rules or calculations based merely on hypothesis, and not be content with assumptions when facts can be ascertained, even if such ascertainment be laborious and costly."

But it is not sufficient to ascertain facts, which are apt to prove as misleading as figures unless properly used. In engineering progress, the operation is always that of extending from the known to the unknown; and the uncertainty as to the result proceeds not more often from the use of undetermined data than from insufficiency of such data as are certainly known to bear the construction sought to be put upon them. The question of wind pressure is a particularly glaring example of the latter rather

than of the former possible source of error. Tredgold was correct as regards his starting point; but the error crept in when his datum was treated as a unit, to be multiplied *ad infinitum*. We may get our experimental results quite accurately, and yet fail to reason from them correctly. An illustration of this kind of failure is the obstacle that was placed, and remained for years, in the way of gaseous firing for industrial furnaces, by an imperfect understanding of the calorific tests of carbon burnt to carbonic acid and carbonic oxide. There was no doubt that carbon burnt to carbonic oxide, and this again burnt to carbonic acid, gave a much lower total calorific return than carbon burnt directly to carbonic acid. All the physicists said so; and, of course, all the text-books on heat faithfully reproduced their dicta, until Mr. Frederick Siemens was able to come and sweep all this teaching away. It was the same in regard to the principle of the regenerative gas-burner. Careful experimenters looked into the principle, and reported that there was nothing in it. But again the theoretical impossibility was proved to be a practical success. When the incandescent gas-burner first came out, there were not lacking those who shook their heads over the proposal to get more light out of gas by making its heat act upon a foreign body than could be obtained by burning its "natural" carbon. Many more illustrations of the risk of relying upon *à priori* assumptions in the arts and sciences might be adduced.

There is another side to the picture drawn by Sir J. Barry—the too frequent presumption of outsiders that because the experts are sometimes shortsighted or mistaken, they do not know more of their own subjects than an uninstructed member of the general public. Let an outsider attempt to formulate such a criticism of physical science and engineering as this address of Sir J. Barry, and he would quickly discover that there is a good deal to be known about such matters before anyone can perceive their shortcomings. With all his candour, Sir J. Barry spoke to the initiated, and not to the populace; and only the former can hope to profit by his warnings.

GAS ACTS FOR 1898.

We commence to-day our notice of the gas and water legislation of the year. The following Acts of Parliament, relating either wholly or in part to gas supply, were passed last session:—

The Clacton-on-Sea Gas and Water Act incorporates with statutory powers a Company formed in 1875. The Company obtained a Provisional Order in 1876, and again in 1885. At the time of going to Parliament, the subscribed and paid-up share capital of the Company was £20,000 of original 10 per cent. capital, and £10,000 of additional 7 per cent. capital; with a loan of £12,500. By the new Act, the capital is increased to £40,000, whereof £30,000 is called the original capital, and £10,000 is the new 7 per cent. capital. Though the whole of the old capital is thus called "original," the rates of dividend payable in respect thereof remain as before. Borrowing powers to the extent of one-fourth of the share capital are granted, without prejudice to the existing loan. The gas and water undertakings are to be divided. The gas limits are the urban district of Clacton, in the county of Essex. The maximum price of 15-candle gas is 6s. per 1000 cubic feet. Four per cent. interest is to be allowed on consumers' deposits. An agreement dated April 15, 1898, between the Company and the District Council, for the transfer of the undertaking is scheduled and made binding. The consideration for the sale of the property is to be a lump sum to be ascertained, if necessary, by arbitration under the Lands Clauses Act, as for a compulsory sale, together with a further sum of £4000 (in full discharge of all claims for back-dividends and compensation to directors, officers, and servants) and the taking over of the mortgage debt.

The Cromer Gas Act incorporates a Company formed in 1874. A Provisional Order was obtained in 1876. The authorized share capital consisted of £5000 in 10 per cent. shares; £5000 in 7 per cent. shares; and £5000 borrowed on mortgage. The limits of the Act are the parishes of Cromer, Overstrand, Runton, and North Repps, all in the county of Norfolk. The capital of the Company is stated to be £72,000 ordinary 5 per cent. stock, whereof £17,000 is to be divided among the old shareholders in the manner following: £9500 is apportioned to the holders of the one thousand £5 shares in the limited Company entitled to a 10 per cent. maximum dividend, at the rate of £9 10s. of ordinary stock in respect of each share; and £7500 of ordinary stock is to be similarly apportioned to the holders of the £5 shares of 7 per cent. in the old Company. New ordinary stock to the amount of £55,000 may be issued, with borrowing powers to the extent of one-fourth. The initial price of 15-candle gas is 4s. 6d. per 1000 cubic feet, with a sliding-scale of 2s. 6d. per cent. of dividend for a penny up or down in the price. Certain lands are to be compulsorily purchased. An agreement between the Company and the trustees of certain lands is scheduled and confirmed. Pipes may be laid in undedicated roads. No penalty is to accrue for unavoidable defects of supply, with the proviso that insufficient capital is not to be pleaded as an excuse. In the event of a consumer's meter being proved defective, the erroneous registration "shall be deemed to have first arisen during the then last preceding quarter of the year, unless it be proved to have first arisen during the current quarter."

The Rhymney and Aber Valleys Gas and Water Act incorporates a Company for consolidating and extending the supply of gas in a region mainly lying in the watershed of the Rhymney River, in the counties of Monmouth and Glamorgan. The capital of the Company is £280,000, whereof £80,000 is gas capital, with the usual borrowing powers. There are eight schedules to the Act dealing with the various interests concerned. The gas undertakings amalgamated or bought up according to the terms of the scheduled agreements are: The Rhymney Gas Company, Limited, the New Tredegar Gas and Water Company, Limited, the Rhymney Valley Gas and Water Company, and the Caerphilly Gaslight, Coke, and Water Company, Limited. All the gas lands occupied by these undertakings are vested in the Company, whose maximum price for 15-candle gas is 5s. 6d. per 1000 cubic feet. The gas is to be tested upon each works used as a separate source of supply. The Rhymney Valley proprietors are to receive share for share in the new Company. The Rhymney Company's proprietors are to be bought out at the price of £20,475. The proprietors of the Caerphilly Company are similarly bought out at the price of £6000. Sanction is given for the acquisition by agreement only of the undertaking of the New Tredegar Gas and Water Company, Limited.

The St. Anne's-on-the-Sea Gas Act incorporates a Company formed in 1875, who obtained a Provisional Order in 1876, fixing their capital at £15,000. A portion of the undertaking was purchased by the Blackpool Corporation, under the powers of their Improvement Act of 1893. Of the Company's prescribed capital, 1409 shares of £5 have been issued as ordinary shares, and 1168 as preference shares entitled to a cumulative preferential dividend of 7 per cent. There was also a loan of £13,000. In 1886, the Company created a contingent yearly rent-charge of £268 in favour of the St. Anne's-on-the-Sea Land and Building Company, Limited, in discharge of a debt of £5370 17s. No dividends whatever have been paid on the ordinary shares of the Company; and the preference dividend is in arrear. The capital of the Company is increased to £60,000, by the addition of £45,000 of 5 per cent. capital. Further borrowing powers are conferred, under special conditions. Additional gas lands are to be acquired compulsorily within two years; and a subway under a railway is to be constructed. The maximum price of 15-candle gas is 5s. per 1000 cubic feet. Three per cent. interest is to be allowed on consumers' deposits. The period of error in defective meters is to be limited to the quarter preceding the testing, unless it shall be proved to refer only to the current quarter. Power is given for the inspection of interior gas-fittings in new buildings, with the right of refusal to supply in case of defect. Tenants are made liable for sub-tenants' gas accounts up to three months. Gas-pipes may be laid in undedicated roads in the district.

The Sherringham Gas and Water Act incorporates a Company formed in 1887, who obtained a Provisional Order in 1888 giving them a district comprising the parishes of Sherringham and Beeston, in Norfolk, and a gas capital of £6000. The Act adds £12,000 of 7 per cent. stock to the gas capital, with the usual borrowing powers. Surplus lands may be leased or sold. The Company obtained the sliding-scale by their previous Order, ten years ago.

The Stirling Gas Act incorporates a Company originally formed by a contract of copartnery in 1845. The capital stock of the Company was £12,400, with power of augmentation to any sum that might be deemed expedient by two-thirds of the partners present at a general meeting convened for the purpose. There was no limit to the dividend. In 1878, the Directors, taking into consideration the fact that from time to time large sums from the revenue of the original Company had been laid out in forming additions to the works and plant, of which no systematic account had been kept, had a valuation made, and found that the works represented £30,000. The process went on as before; and when they came to Parliament, the original Company had no debt. The capital now consists of a sum of £40,006 2s. 6d. of original capital and £10,000 of new authorized 5 per cent. capital. Of the former amount, £24,000 is "A" capital, entitled to 10 per cent. dividend; the balance being 5 per cent. "B" capital. The usual borrowing powers are conferred in respect of all the share capital. The Company's books are to be made up to May 15 in each year. Surplus lands may be leased or sold. Three per cent. interest is to be payable on consumers' deposits. The sliding-scale is applied, with the initial price of 3s. 4d. per 1000 cubic feet for 25-candle gas. Discounts up to 10 per cent. may be allowed. The period of error in the case of defective meters is limited to the current quarter, unless the contrary is proved to the satisfaction of the inspector who tests the meter.

The Whitwick and Coalville Gas Act incorporates a Company formed in 1859 for the purpose of supplying with gas the parish of Whitwick, in Leicestershire. The old share capital consists of £8000, besides a loan of £2500. The works have been improved out of revenue to the amount of £2000. The limits of the Act are defined. The capital of the Company now consists of £8000, representing the 10 per cent. share capital of the limited Company; £2000 called capital stock "B," earning 5 per cent., and representing the improvement expenditure out of revenue; and £5000 additional 7 per cent. capital. Capital

stock in the original Company is transferable in sums of five shillings and multiples thereof. Clause 32 enacts that the Directors may, if they think fit, annually appropriate out of the revenue of the Company, and as part of the revenue account, any sum not exceeding 1¾ per cent. on the paid-up capital as a renewal fund. This fund may accumulate until it amounts to 5 per cent. on the paid-up capital, and does not exceed £1000. This is additional to the customary insurance fund. The usual borrowing powers are given. The sliding-scale is enacted, operative for every half year, with an initial price of 4s. 2d. per 1000 cubic feet of 15-candle gas, tested on or within 200 yards of the works. Pipes may be laid in undedicated roads. "All fittings connected with any service gas-pipe to communicate with the mains and pipes of the Company which shall be provided by any person, shall be placed and removed under the superintendence of the Company, and at the expense of such person." Prepayment for supplies of gas may be required in certain instances. Error in the case of defective meters shall be deemed to have first arisen during the then last preceding quarter of the year, unless it be proved to have first arisen during the then current quarter. Discounts up to 20 per cent. are sanctioned. If the Coalville Urban District Council shall introduce a Bill in Parliament next session to enable them to purchase the undertaking, the Company are only to oppose on clauses. Arbitration upon the transfer price is to be under the Lands Clauses Acts, on the basis of compulsory sale. In addition to the ascertained value of the undertaking, the Company are to receive the actual costs of the Act, and the costs of winding up and compensating officers and servants; but the arbitrator is not to have regard to the fact of the Company being incorporated by Act of Parliament.

ACETYLENE PLANT FOR HOUSE SUPPLIES.

THE most promising sphere of usefulness for acetylene at present appears to lie in the supply of buildings which are placed out of reach of the ramifications of the mains of gas-works undertakings. Undoubtedly acetylene has a very legitimate application in this direction. The difficulties of its safe generation must, however, be completely overcome; and the gas must be adequately purified. The odour of the unpurified gas must not be in evidence within the immediate precincts of a dwelling-house; for it is sufficiently objectionable and potent to cause many to refuse to use acetylene solely on account of its prevalence wherever an acetylene installation is placed. We give the organizers of the late Acetylene Exhibition at the Imperial Institute credit for recognizing this fact, and for placing the generating plant far enough from the public galleries to prevent casual visitors complaining of the odour. In that instance, also, the best carbide was used, and the generators were not cleaned or re-charged during the hours when the Institute was frequented by the public. But other cases might be quoted to show that the precautions taken there to prevent the smell of the gas asserting itself at inconvenient times were necessary in order to avoid a bad impression of the new illuminant being created. In many instances in which acetylene is used, there is no doubt the uninitiated do not locate the source of the most objectionable smell, as they certainly would have done at the exhibition at the Imperial Institute had it not been carefully suppressed. But at the International Universal Exhibition at Earl's Court there are some acetylene installations; and the first warning a visitor receives of their proximity is the objectionable odour of impure acetylene. If he is familiar with it, he naturally looks for acetylene flames among the myriads of other lights, and discovers them perhaps thirty or more feet distant! If he is not familiar with the odour, and does not naturally associate it with acetylene, the connection between it and the small bright flames he sees escapes notice. Most of these acetylene lights are virtually in the open air; and the odour therefore would be much more strongly in evidence were the installation situated within a building. It is very essential that acetylene plant to supply dwelling-houses should be placed not less than ten yards from them, and should include purifiers capable of removing objectionable impurities from the gas.

Generators in which the feed is automatically controlled according to the consumption of gas are usually unreliable, and few (if any) are suitable for providing the gas supply for a house. Generators of which the action is not subject to automatic control are numerous; and in our articles on the exhibits at the Imperial Institute, we mentioned several which appeared to be free from grave faults. Among these was one made according to the patents of Professor Raoul Pictet (see *ante*, p. 251). The Berlin Company which owns Professor Pictet's German patents has modified the apparatus in several respects, and, according to the "Journal für Gasbeleuchtung," has greatly improved it. In the present form of the German generator, lumps of carbide are dropped through an opening in the side of a feeding-shoot attached to one side of the generator. The opening is closed by a weighted flap-valve, except when the valve is lifted by hand for the purpose of introducing carbide. The base of the feeding-shoot is inclined, and opens into the generator, in which is an inclined grid, down which the carbide rolls as it falls from the shoot. The generator and shoot contain water, which stands at a somewhat higher level in the shoot owing to the small back-pressure thrown by the purifiers on the gas in the upper part of the generator. There is an overflow-pipe from the shoot, by which water can escape when the evolution of gas in the generator causes the level of the water in the shoot to rise above the orifice of the overflow-pipe. Water is introduced when necessary through the shoot, and air is completely expelled from the generator through a cock in its top, by filling that vessel with water before any carbide is introduced, and then passing purified acetylene from the gasholder into the generator until the working level is established. The way from the generator to the purifiers is next opened. Carbide is then introduced through the shoot, and rolls down the inclined surfaces to the side of the generator which lies opposite the shoot. The gas evolved cannot, therefore, pass up the shoot, but collects in the upper part of the generator, and passes on to the purifiers; while the water it displaces escapes by the overflow-pipe from the shoot. The carbide, as soon as it enters the apparatus, is completely immersed in water; and therefore there can be no after-development of gas. The pressure in the generator cannot become excessive, as it is limited by the water-seal in the shoot. A mixture of air and acetylene cannot occur in the generator. The operation of generating the gas is thus made simple and safe; and the addition of the special shoot and flap-valve through which the carbide is fed, removes the chief objection to the English form of the apparatus—viz., the very objectionable smell due to the escape into the atmosphere of small quantities of gas.

Great attention is paid to the proper purification of the gas in the German plant. We have always contended that English manufacturers of acetylene plant were too much disposed to ignore the fact that the gas needs purification, even if good carbide is employed in its manufacture. The Pictet acetylene apparatus as made in Germany purifies the gas according to a scheme elaborated by Professor Pictet and Dr. Wolff. The different impurities are removed in turn. The gas is first washed with a solution of calcium or magnesium chloride, by which the greater part of the ammonia and sulphuretted hydrogen in the gas is abstracted. It is then treated with lead acetate and silver nitrate, which remove the phosphuretted hydrogen and whatever sulphuretted hydrogen remains in the gas. It then passes through a desiccating chamber into the storage holder, and it is again dried when it leaves the latter. The purifiers have lids sealed in water lutes, so that any dangerous amount of pressure in the vessels is impossible. The scheme of purification is a systematic one, and should prove efficient.

We have referred to this modification of Professor Pictet's plant, because it appears to have been designed with the care which should be bestowed on an apparatus for the supply of acetylene to an isolated house dependent on it for artificial light. No doubt it is far from perfect in many respects; but it embodies the points which we deem essential in an acetylene plant for house supplies. These are briefly: (1) The generation of the gas by the addition of carbide to water instead of by the converse operation; (2) provision for preventing the overheating of the gas and for avoiding undue pressure and the presence in the apparatus of mixtures of gas and air; (3) provision of a gasholder of sufficient capacity to supply at least the maximum 24 hours' demand; (4) provision of a generator capable of filling the holder in about 20 minutes, so that the plant only needs the services of an attendant for about half an hour daily; (5) provision of adequate purifying apparatus.

It should not be difficult to construct generating and purifying plant which embodies these essential points, and is of simple construction. If such a plant be placed under a simple roof with light supports, at a sufficient distance from the house to prevent any smell which arises during generation penetrating to the interior of the house, it should be free from the objections which are legitimately urged against the acetylene plants commonly offered for house supply. Granting that a proper plant for the supply of the acetylene can be obtained, there remains the unsettled question of how to burn the gas to the greatest advantage. This question must be answered by the manufacturers of burners, who, however, have so far not succeeded in producing a really satisfactory acetylene burner.

Inspection of Gas Pipes and Fittings.—In the course of a report by Mr. C. A. Ball, Inspector of Plumbing to Captain Lansing H. Beach, the Engineer Commissioner of the District of Columbia, he advocates the systematic inspection of gas pipes and fittings. As is well known, lives have been sacrificed through the use of improper appliances for the distribution of illuminating gas; and it is suggested that the Commissioners' powers should be enlarged to provide for the periodical inspection of the principal hotels and boarding-houses, to ensure safety.

A Pocket Dictionary of Hygiene, by Mr. C. T. Kingzett, F.I.C., and Mr. D. Homfray, B.Sc., has just been issued by Messrs. Baillière, Tindall, and Cox, of King William Street, Strand. In the compass of 104 small pages, the authors have endeavoured, as far as possible, to give concise information respecting most of the subjects comprehended in the theory and practice of hygiene. Their chief object has been to supply Medical and Sanitary Officers with a pocket dictionary for reference in connection with their work. Six pages are devoted to the subject of water and its purification; lighting and warming being dealt with more briefly. The print is small, but it is very clear.

PERSONAL.

Mr. J. J. MAYHEW has been elected Secretary of the Southwold Gas Company.

Mr. HENRY POND has been appointed Secretary and Manager of the Marlborough Gas Company in succession to the late Mr. Joseph Phelps.

The personal estate of the late Mr. J. BARKELEY SMITH, Vice-Chairman of the Liverpool United Gas Company, whose death was recorded in the "JOURNAL" a few months ago, has been valued at £92,822; the gross value of the whole estate being put at £97,817.

Mr. T. GREAVES, the Manager of the Melton Mowbray Gas Company, is retiring after thirty years' service, on account, we regret to say, of failing health. His successor is to be Mr. GEORGE H. DUNCAN, the present Manager of the Gorebridge (Midlothian) Gas-Works.

Mr. W. H. HUMPHREY, Chief Accountant of the West Hartlepool Gas and Water Company, has been elected Secretary and City Manager of the York Water-Works Company—a post which was recently advertised in the "JOURNAL." Mr. Humphrey received his training in the office of the West Hartlepool Company, and has remained in their service; rising to the highest position in his department. His present employers highly appreciate his ability and devotion to duty; and, while they are sorry to part with him, they are highly pleased that his many excellent qualities have received recognition by his appointment at York.

Mr. WILLIAM WELCH, the Superintendent of the Aston pumping-station of the Birmingham Water Department, last Friday completed his term of service with the Corporation, and retired on superannuation. Mr. Welch entered the service of the late Water Company on July 1, 1863, as Superintendent at Aston, and has held the position continuously since that date. He was on Friday presented with a gold watch as a parting token of respect from the members of the staff and the workmen at the station. The presentation was made by the Secretary in the presence of the contributors; and Mr. Welch feelingly and appropriately acknowledged the gift, and bade farewell to his old associates.

OBITUARY.

We regret to learn that Mrs. NORTH, wife of Mr. William North, of Stourbridge, died suddenly last week.

The death is announced of Mr. JOHN PANTON, one of the Directors of the Blairgowrie Gas Company and Chairman of the Blairgowrie Water Company.

Mr. W. G. SANDFORD, the Chairman of the Cromer Water Company and a Director of the Gas Company, died suddenly last Friday morning from hemorrhage of the brain. He was well known in the locality.

We regret to record the death, after a short illness, of the Right Hon. Sir ARTHUR B. FORWOOD, M.P., whose name will be familiar to our readers from his connection with the municipal affairs of Liverpool. He entered the Town Council in 1871, and six years afterwards he was chosen Mayor. In 1880 he was elected an Alderman—a position which he held, with a brief interval of a month, until his death. It was at his initiative that many much-needed sanitary reforms were undertaken, that Acts of Parliament were obtained for the erection of workmen's dwellings, that the city loans funding scheme was adopted, and that the tramway and electric lighting undertakings were purchased by the Corporation. Curiously enough, he was an uncompromising opponent of the Vyrnwy water scheme, on account of its great cost; and it is curious to recall the fact that, though overwhelmingly approved by the ratepayers, the project was carried in the Council by a majority of only one. Two years ago, Sir Arthur's name came prominently before our readers as the Chairman of the Lighting Committee of the Corporation, a Special Sub-Committee of which conducted a searching inquiry, with the assistance of Mr. Charles Hunt, into the relations existing between the Municipality and the Gas Company. The conclusion they came to, it may be remembered, was unfavourable to the purchase of the Company's undertaking; but this was not endorsed by the Committee. The Council adopted their report, and referred to the Committee the question of the best means of carrying out its recommendations. The further progress of the matter will be in the recollection of our readers. Sir Arthur was a keen politician, and the recognized leader of the Tory party in Liverpool. At the General Election of 1885, he was returned by a large majority for the Ormskirk Division of Lancashire, and in the following year was appointed Parliamentary Secretary to the Admiralty—having a few months previously become a member of the Privy Council. He was created a baronet in 1895. Lady Forwood and eight children survive him. At a special meeting of the Liverpool Constitutional Association, held last Thursday, the Chairman (Mr. E. Lawrence, the Chairman of the Liverpool United Gas Company), paid a warm tribute to the memory of the late Baronet, and a resolution was passed expressing the sense of the Association of his great services to the Conservative party. The funeral took place on Friday, at Childwall.

NOTES.

A Test for Phosphuretted Hydrogen.

A convenient test for phosphuretted hydrogen in acetylene or other gases is described by Herr J. L. C. Eckelt, in a recent number of the "Zeitschrift für Angewandte Chemie." A large test-tube or a bottle is inverted; and a cork perforated in three places is fixed in its mouth. The central perforation carries a rod bearing at its top two hooks or clips, which hold slips of prepared paper. The other two perforations serve for the inlet and outlet tubes for the gas, which is thus passed through the vessel and envelops the slips of prepared paper. The gas prior to admission to the apparatus is freed from sulphuretted hydrogen by means of the hydrate of an alkali or alkaline earth. The paper is prepared by saturating it with a solution of silver nitrate. The gas, on coming in contact with the slips thus prepared, will not affect them if it is free from any sulphuretted hydrogen and phosphuretted hydrogen. As the sulphuretted hydrogen is previously absorbed, a blackening of the paper indicates that phosphuretted hydrogen is present. Even traces of this impurity form silver phosphide, which in the presence of excess of silver nitrate is converted to gray metallic silver, which gives the paper a dark colour. The central rod, if prolonged below the cork, may fit into a suitable stand for holding the apparatus in an upright position during use.

Gas Lighting and Fire Prevention.

The approach of the winter, with its evening entertainments, suggests that gas managers might well take the opportunity for bestowing a little attention upon the lighting arrangements of the public buildings and assembly rooms in their districts, with special regard to the question of safety in the event of fire and panic. The fashionable employment of electricity for this class of lighting in populous places, does not absolve gas from the duty of watching over the safety of audiences—indeed, it rather increases and accentuates it, by reason of the fact that corridors, staircases, and the approaches to ordinary and emergency exits are still lighted by gas. The electric light would be one of the first things to fail in the event of fire breaking out in a building; whereas gas would go on burning so long as any air remained to support combustion, or the pipes existed in serviceable condition. The ordinary gas supply of a building, public or private, is insufficient to contribute to the seriousness of a conflagration of any magnitude; while the light of the gas-flame may make all the difference as regards the saving of life. Though responsibility in this matter does not come in the first place upon a gas manager, there is a moral obligation upon gas lighting authorities to co-operate as fully as their powers and opportunities permit with those who are directly concerned in seeing that the indoor amusements of the people are as far as possible safeguarded from danger of fire. In this connection, the words of an expert are worth repeating: "Every relaxation beyond what a prudent man would consider safe is in the nature of a wager that nothing shall happen during the whole time that the building will be in existence, which will call for the particular precaution which has been injudiciously omitted. It may be that the wager will be won; but the risk is considerable, and always there."

The Supply of Material for Incandescent Gas-Burner Mantles.

It is sometimes a matter of speculation whether the available supply of the materials required for the composition of the mantles of incandescent gas-burners will be sufficient to satisfy the demand. The suspicion that these substances may be used up in the course of a few years is apparently justified by the fact that, in the first place, the source of the incandescing material was stated to be the "rare earths;" and it is obvious that the quality of scarcity is incompatible with any large or widely-distributed supplies of these minerals. M. Truchot sets himself to prove in the "Revue Générale des Sciences" that there is no reason for fear upon this score; the sources of thorite, monazite, and zircon being really to all intents and purposes inexhaustible. The truth appears to be that the appellation "rare earths" has become a misnomer. This class of minerals was only rare, or scarce, so long as there was no industrial use for them, and they were only chemical or mineral curiosities. Monazite, the chief source of thorium, was at one time recognized as a residual of alluvial gold washings; but now the chief supply is obtained from sand banks on the coast of Brazil, where the continuous destruction of the rocks by sea action has led to a natural grading of the deposit. There is thus plenty of thorium and zirconium to be had. Valuable deposits of zircon have recently been discovered in North Carolina and Colorado, in Texas, and in Australasia, especially the latter. This notable find, which covers an area of about 105 acres, is situated on the north-east side of Tasmania. It is almost entirely composed of zircon, containing 63 to 64 per cent, of oxide of zirconium, with variable quantities of lanthanum. didymium, thorium, niobium, erbium, cerium, and chromium. M. Truchot therefore arrives at the comforting conclusion that the industry of incandescent gas lighting can never use up the enormous mass of so-called rare minerals actually in sight.

The Efficiency of Lagging for Steam-Pipes.

All steam users are confronted with the question of lagging as a preventive of condensation; and in the United States, where steam heating is prevalent, incessant studies are directed to the

solution of the problem of preventing loss of heat by covering steam supply-pipes with non-conducting coatings. Some good general conclusions respecting this matter are formulated by M. Compère, the General Manager of a French steam users' society. As the result of prolonged and extensive experiments, M. Compère finds that in uncovered copper steam-pipes condensation is rather less than with iron pipes. An important point is that any substance used for lagging should be efficacious for a slight thickness, because the efficiency of such a coating does not always increase with the thickness of the coating, and may even decrease. This latter effect is by reason of the enlarged surface presented by an over-thick lagging, which may cause more loss than the extra thickness is competent to save by its lessened conductibility. It is generally advisable to varnish plastic coatings. For instance, with cement over cork and not varnished, a loss by condensation of 29·7 per cent. was observed, which was reduced to 21·7 per cent. when the same cement received three coats of varnish. Not only does the varnish exert a good effect as regards condensation; it also retards the disintegration of the coating material. It is a good plan to cover any non-conducting coating with a casing of sheet zinc, which invariably increases the effect. For instance, the condensation of a copper pipe covered with cork was 33·8 per cent., which was reduced to 24 per cent. by enclosing the cork in zinc. The case is summed up in the following proof: The condensation in a copper pipe lagged with cork and cemented was 29·7 per cent. This was reduced to 21·7 per cent. by adding three coats of black varnish; and, by enclosing the whole in zinc, the condensation was further reduced to 19·2 per cent.

TECHNICAL RECORD.

INSTITUTION OF GAS ENGINEERS.

The Autumn Meeting in Manchester.

The Autumn Meeting of the Institution was held on Thursday and Friday last. The first day the members were entertained with much liberality at Manchester; but there were two disappointing features, which somewhat detracted from the otherwise successful day. One was that rather less than one-fourth of the members were in attendance; and the other, that in the afternoon there was a break in the weather, and the rain which fell seemed to have a damping influence on the spirits and energies of some of the members, a few of whom quietly surrendered the privilege of visiting interesting works at Salford, and retraced their way to the city. The programme was a complete one; and it was manifest that much care had been exercised in the drafting of the arrangements, in order to give the members the maximum amount of enjoyment and instructive sight-seeing between the hour of ten in the morning and nightfall. The *rendezvous* was the Queen's Hotel; and there, shortly before the appointed time, the members were met by their President, Mr. George E. Stevenson, who is the Chief Engineer to the Manchester Gas Committee, and has also charge of the Rochdale Road works. By omnibus the members were first conveyed, through one of the most unattractive quarters of the city, to the

Bradford Road Station.

Here they were gracefully received by Mr. Charles Jennison, the Chairman of the Sub-Committee whose particular duty it is to look after these works. The President was most assiduous in imparting information to his visitors; and he was ably assisted by the Station Manager (Mr. Rodger). As Mr. Stevenson pointed out, the works are extensive, and the plant and buildings are large; but there is little about them that can be characterized as novel. However, a few general particulars may be given of these and the Gaythorn works, by way of supplement to the plans furnished to us by Mr. Stevenson, and which appear on pp. 747-8. The area of the Bradford Road station is above 53 acres; but it is not all occupied. The value of the station stands in the books of the department thus: Land, £126,032; buildings, £188,581; and apparatus, £333,334—a total of £647,947. There are two retort-houses, each containing 28 settings of horizontal through retorts, with nine retorts in a setting. The retorts are of ∩ section, 24 in. by 16 in. The total manufacturing capacity is about 8 million cubic feet. Both houses are provided with West's stoking-machines worked by compressed air; and the retort-settings are all heated by regenerator furnaces. The coal is delivered by an overhead railway; and the coke is removed by trolleys drawn by horses and running on rails. The condensing plant consists of three Morris and Cutler water-tube condensers and one "Eclipse" condenser, with vertical columns. There are two sets of twin rotary exhausters and engines combined, by Gwynne and Co., each set being capable of passing 280,000 cubic feet an hour; and two sets of twin exhausters and engines, by Laidlaw and Sons, of 240,000 cubic feet an hour capacity. The scrubbing and washing plant comprises four Livesey washers, each of a capacity of 4 million cubic feet per diem, two Kirkham and Hulett rotary "Standard" washer-scrubbers of 2¼ million cubic feet capacity, and one Clapham and Laycock washer-scrubber for 3 million cubic feet per diem. The purifying-shed is 410 feet long, and contains 22 purifiers. A wing has been added with eight additional purifiers for the carburetted water gas. The total area of the purifiers is 27,000 square feet. Some of the members made a mental note of a little "wrinkle" in connection with the purification—that was, the use of a plough for promoting the revivification of the spent oxide. There are four station meters, each of 175,000 cubic feet an hour capacity. The storage accommodation consists of five holders. Four of them are treble lift, of 150 feet diameter, and having a joint capacity of 6,800,000 cubic feet. The other, which is also a treble-lift one, is of recent construction. It is 250 feet diameter; and its capacity is 7 million cubic feet. The portion of the works' plant in which the visitors displayed the greatest interest was the carburetted water-gas installation, which was erected in accordance with the advice, and under the direction, of Mr. Corbet Woodall. The plant consists of four sets of Humphreys and Glasgow's producing apparatus, each of a capacity of 750,000 cubic feet per diem; and it is erected in a building constructed to permit of duplication. The installation also comprises three Lancashire boilers, two blowing-engines and fans, two exhausters with engines, of Messrs. R. & J. Dempster's make, and the necessary pumps, oil-meters, &c. A compensating gasholder, 80 feet in diameter, and an oil-tank are erected at a short distance from the building. At the time of the visit, only two sets of the plant were in operation—making about 1 million cubic feet of gas per day, as against the present production of about 4 million cubic feet of coal gas. Up to now the proportion of water gas to coal gas has not exceeded 25 per cent.; but in this relation we believe Mr. Stevenson's feeling is that one-third of water gas to two-thirds of coal gas would be a serviceable proportion.

Departing from the Bradford Road works, the members were transported to the opposite side of the city, where are situated

The Gaythorn Works.

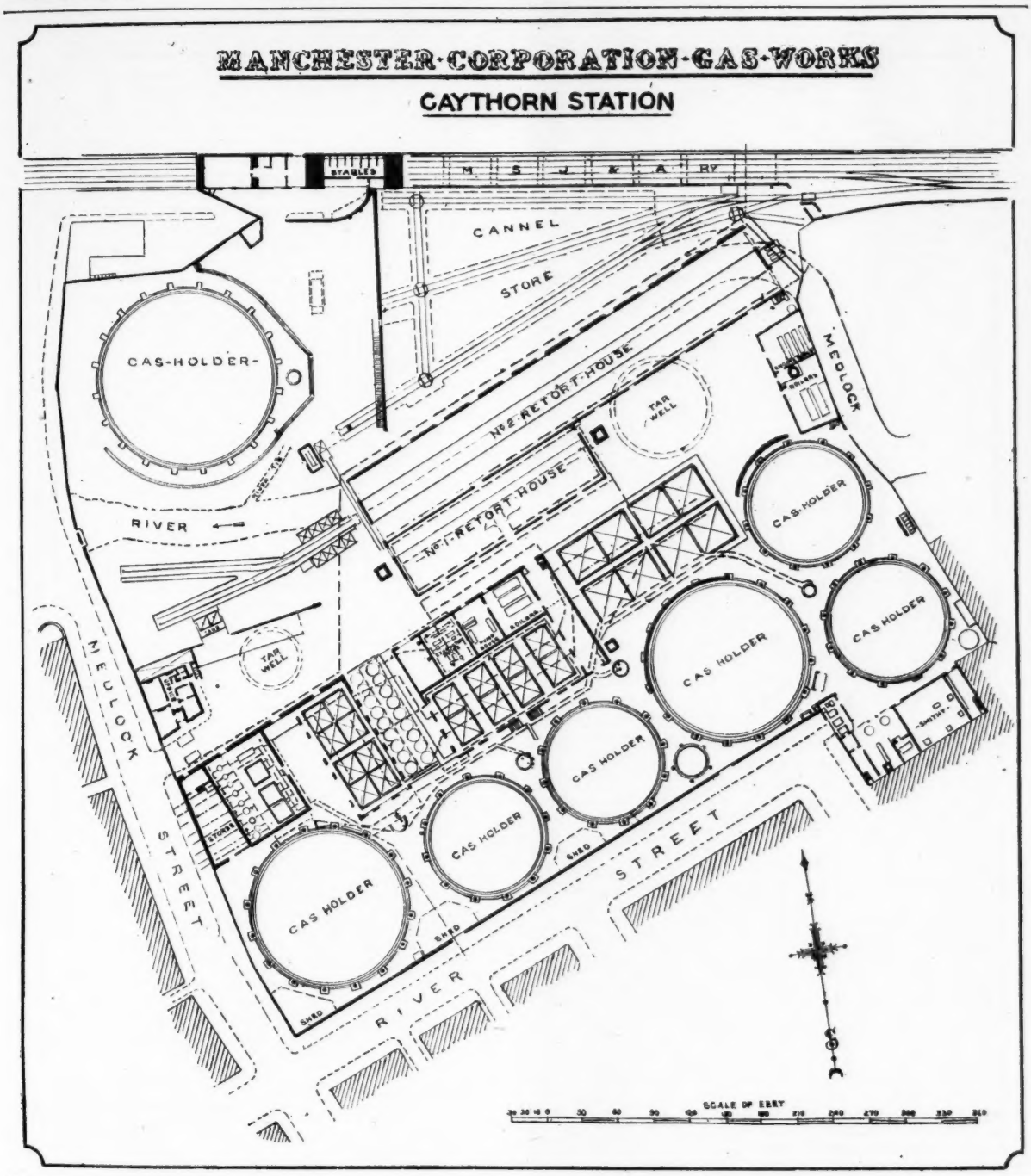
Mr. Bowes, the Chairman of the Station Sub-Committee, welcomed them; and in the tour of the establishment the President was aided in affording information by Mr. Merrill, the Manager. The area occupied by these works is nearly 9 acres; and they are credited in the books of the Gas Committee with a total value of £250,379—divided as follows: Land, £70,474; buildings, £67,397; and apparatus, £112,508. The retort-houses were first inspected. No. 1, which has been recently constructed, is fitted with 18 settings of inclined retorts, six in each setting, with regenerator furnaces. The retorts are ∩ shaped, 20 feet long and 24 in. by 14 in. in section, and are set at an angle of 31°. The coal is broken, elevated, and conveyed into continuous bunkers by machinery; and the retorts are charged by means of the usual travelling shoots on the Automatic Retort Company's plan. Plant has been laid down by West's Improvement Company for removing the coke by a drag-chain conveyor, and elevating it into hoppers for loading into carts. At the time of the visit, this was not quite in readiness for working, as had been expected; but the visitors gave a good deal of attention to it, embodying as it does some of the latest improvements which experience has introduced for minimizing the wear and tear to which such plant is particularly susceptible.* The productive capacity of the inclined retort installation is estimated at about 1¾ millions. The second retort-house contains 41 settings of through horizontal retorts of the ordinary type, six retorts in a setting; its productive capacity being about 3 million cubic feet per diem. This house is furnished with Foulis hydraulic stoking-machinery. The condensing plant consists of one large rectangular horizontal condenser, 107 feet long by 22 feet wide and 15 feet deep; and there are three sets of twin rotary exhausters with engines combined, each set being of 100,000 cubic feet an hour capacity. The scrubbing plant comprises 18 scrubbers, 32 feet high and 10 feet diameter; and these are to be shortly supplemented by rotary washer-scrubbers and Livesey washers. There are three sets of purifiers (in all 24 boxes), with a total area of 15,000 square feet. The station meters, three in number, are each of 100,000 cubic feet per hour capacity. To some of the visitors three of the gasholders presented a feature of interest, and that was that the top lift of each is guided by wire ropes on the Pease system. The total storage capacity of the seven treble-lift holders on the works is 6 million cubic feet.

Rochdale Road and Droylsden Stations.

Time did not permit of a visit to these stations; but concerning them it may be stated that the first occupies an area of 9 acres, including the Newtown gasholder station; and the second, about 5 acres. The total value of the land, buildings, and apparatus at the Rochdale Road station is £295,547; and at Droylsden, £27,108. The total manufacturing capacity of the Rochdale Road station is 7¼ million cubic feet per diem; and of the Droylsden works, 400,000 cubic feet.

Taking the whole undertaking, the total capital (per book values) is £1,969,333; the productive capacity, 23½ million cubic feet per diem; the storage capacity, 25½ millions; the annual consumption of coal and cannel, 400,000 tons; and the greatest daily consumption of gas, 23,824,000 cubic feet. The mileage of mains is 767¾; and their value, £442,101. The number of meters is 104,752; and their value, £167,197. There are 5188 stoves on hire; and their value is given as £23,991.

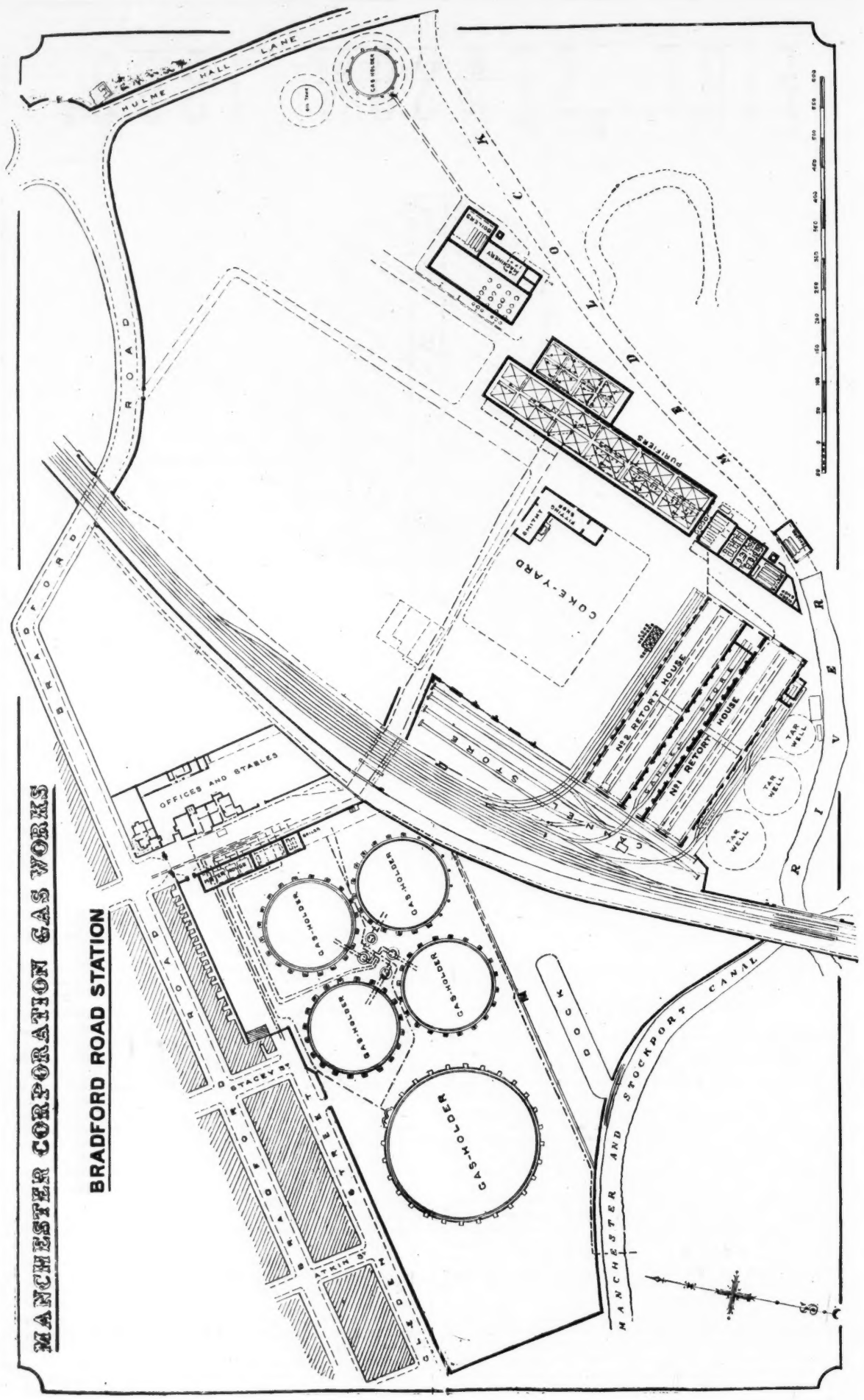
* A description of the plant here referred to is given on p. 756. We understand that later in the day it was set to work, and ran satisfactorily.



Luncheon at the Town Hall.

On completing their inspection of the Gaythorn station, the members repaired to the Town Hall, to fulfil an engagement with the Lord Mayor and Chairman of the Gas Committee (Mr. Alderman Gibson), whose hospitality took the form of a luncheon served on a magnificent scale. An interesting surprise was here in store for the members; Lord Roberts, who was staying in the city for a short time as the guest of the Lord Mayor, having accepted the invitation of his host to be present at the function. On entering the banqueting-hall, the distinguished soldier was received by the assembled company with the utmost enthusiasm, which he very genially acknowledged. After luncheon, the Lord Mayor proposed the "Health of the President and Members of the Institution of Gas Engineers;" and the speech which he made indicated that his Lordship takes a genuine interest in matters affecting the gas industry. Below is a summary of his remarks, and also of those made by Mr. Stevenson in reply. Coming as the latter did from the Chief Engineer of a large gas undertaking situated in what may be termed one of the strongholds of The Gas Institute, and in the neighbourhood of Salford, they convey more than their superficial simplicity would indicate to an outside hearer.

The Lord Mayor observed that it was a great pleasure to him to be Chairman of the Corporation Gas Committee at the same time that their Chief Engineer had had conferred upon him the honour and dignity of the presidency of the Institution. He ventured to say there never was a time in the history of this country when it was more important that gas engineers should be very much alert to the duties and responsibilities attaching to the offices they held. There was no great difficulty about making gas; it was a very simple matter. But it was not so simple to make gas of high illuminating power and quality; and when they stood face to face with that brilliant illuminant electricity, it was of the first importance that gas engineers should exercise all the intelligence, ingenuity, and brain power they possessed, so that they might not be absolutely run out of the field. It was a very extraordinary thing that, not only in Manchester, but everywhere else that he knew of where electricity had become a great and potent factor, the increase in the production of gas had kept pace with the increase in the demand for electricity. In Manchester some four or five years ago, the Corporation started an electric installation (which they then thought a large one), with a maximum capacity of something like 20,000 16-candle power lamps; and they considered it would last a decade at least. But it did not suffice for twelve months; and now he supposed they had 70,000 lamps in Manchester alone. In spite of this, however, they had had a considerable increase in the consumption of gas. He wished to refer to another matter—that was, the troublesome problem of naphthalene. They were suffering from it somewhat in Manchester—perhaps rather more this year than they had ever done before. But his experience was that they did not have so much trouble where a fair proportion of carburetted water gas was supplied. He had had to fight this carburetted water gas question in Manchester against some very powerful antagonists; and the Gas Committee so far succeeded that they


MANCHESTER CORPORATION GAS WORKS
BRADFORD ROAD STATION
HULME HALL LANE
BRADFORD ROAD
ROCHDALE ROAD
STACEY ST
ATRIM ST
OFFICES AND STABLES
COKE-YARD
STORE
No 2 RETORT HOUSE
No 1 RETORT HOUSE
TAR WELL
TAR WELL
TAR WELL
GAS-HOLDER
GAS-HOLDER
GAS-HOLDER
GAS-HOLDER
GAS-HOLDER
WOOD
MANCHESTER AND STOCKPORT CANAL
RIVER IRWELL

were able to make carburetted water gas months before their opponents knew of its existence. Some of them, however, discovered great difficulties that had arisen through using water gas quite three months before the Committee commenced to make it (laughter); but they had not discovered them since. He believed that carburetted water gas would become an important factor in the gas industry in the future. The Committee had room for duplicating their present plant; and he should not rest contented until he had the building fully occupied. His Lordship concluded by expressing the pleasure it had given him to entertain the members of the Institution, who, he considered, had paid a distinct compliment to the Gas Committee by selecting Mr. Stevenson as their President.

The President, having sincerely thanked the Lord Mayor for the kind reception he had given the Institution, said it was a great gratification to him to be the President of that body, because it consisted of members whose interests were entirely those of professional men—men holding responsible offices under Corporations and Companies. The distinguishing feature of the Institution was that the members professed that they were not in any way connected with trading undertakings or manufacturing concerns. At the same time, they did not hold trading or manufacturing concerns in any contempt whatever; on the contrary, they knew full well their value. But they felt that as engineers, professionally trained for certain responsibilities and duties, they should not mix themselves up with anything which was not their affair—that they should maintain themselves in a position wholly free from outside influences; so that they might be better able to faithfully devote themselves to the duties and responsibilities entrusted to them. Therefore they made it a *sine quâ non* that the members should not be connected with any business otherwise than that of professional engineers which would give them "an axe of their own to grind." They did not believe in it. They wished to retain the confidence of those for whom they worked; and to do so they recognized that they must be perfectly disinterested. Therefore they came there that day—and he would be pleased if the Lord Mayor and the Gas Committee would so regard them—as a body of professional men who were only seeking the welfare of the undertakings of which they had charge.

Visits to Other Industrial Works.

Luncheon ended, the members once more boarded their 'buses, and were conveyed to the extensive engineering works of Messrs. Mather and Platt, where, divided into parties, they were conducted through the several departments. It was observed by the visitors (without any visible sign of fear) that the firm were busily employed upon the production of electrical plant; and they saw, many of them perhaps for the first time, something of the fine and intricate nature of the construction of portions of the machinery. The visit was certainly both interesting and educational. Another drive—this time through rain—brought the members to the large spinning and weaving mills of Messrs. Richard Haworth and Co., of Salford. Owing to the shortness of time at disposal, the various processes—complicated to the stranger, but apparently so simple to the operatives—involved in the conversion of the raw material into calicos and other saleable stuffs could only be hastily witnessed. The establishment (like many other of the big factories in the district) is lighted by electricity generated on the premises; the number of lamps in use in this one instance being 3400.

The Trafford Gas Tramway.

It had been arranged that the evening should be spent at the Belle Vue Gardens; but the changed condition of the weather determined a return to the city. Passing Trafford Park, however, the visitors could not resist an invitation to test the capabilities of the new gas tramway by taking a trip as far as Trafford Hall and back. They were shown the gas-compressing arrangements, the method of feeding the cylinders under the cars, and the working and action of the driving and controlling mechanism. Each car is charged with sufficient gas to propel it some 14 or 15 miles; and the amount used per mile is 23 cubic feet, which, at the price of Manchester gas, represents a cost of slightly under ¾d. The members came away seemingly satisfied that gas traction has "come to stay." This concluded a fairly heavy day's programme.

Excursion to Windermere.

On Friday, a party of about thirty undertook the journey to Windermere. They set out full of doubts concerning the weather; but, though it continued dull throughout the day, there was fortunately no rain. On arriving at Windermere, they were driven in brakes to the Old England Hotel at Bowness, where a hot luncheon was provided. The afternoon was spent in making a tour by steamer of Lake Windermere. On landing again, the excursionists had tea at the hotel, at the conclusion of which Mr. William King, of Liverpool, availed himself of the opportunity of expressing to the President the members' great appreciation of the kindness he and the Lord Mayor and Gas Committee had shown them during the visit to Manchester. A few of the party continued the stay at Windermere over Sunday; and the remainder left early in the evening by train—some for Manchester, others for stations *en route*. Those who completed the journey bid their President adieu at the terminus; thus ending, and adding to the records of the Institution, another profitable and enjoyable autumn meeting.

NORTH OF ENGLAND GAS MANAGERS' ASSOCIATION.

Half-Yearly Meeting at Sunderland.

The Forty-third Half-Yearly Meeting of the Association was held at Sunderland last Saturday. The offices of the Sunderland Gas Company, at the corner of two of the leading thoroughfares of the borough, was the *rendezvous*. The President—Mr. Charles Dru Drury, Engineer to the Sunderland Gas Company—received the members and associates, saw them into conveyances, and drove off with them to the Company's works at Hendon. They are situated on a high bank overlooking the sea, nearly a mile to the south of the town. They were erected in 1863, on a site 17 acres in extent, to designs by the late Mr. Thomas Hawksley, whose association with them makes it almost superfluous to say that they are of massive design. Everything is on a spacious scale, particularly the outdoor areas separating the various buildings. These are of such extent that, were it not for the statement of the officials that the works have now been extended so as to practically cover the whole site, it might be supposed that there was abundance of room for extensions. The visitors were shown round the establishment without reference to the course of manufacture—beginning with the scrubbers, and passing through the purifier-house, the sulphate-house, and the retort-houses, and ending with a stroll round the gasholders. There was evidence on all hands that the works are not only managed with more than usual capability, but that the Company follow a liberal policy in regard to their maintenance. The spick-and-span condition in which everything was found, including the large amount of horticulture with which the works are interspersed, could not have been the result of a "clean-up" for the visit of the Association, but must have been the effect of careful tending, from day to day, for many years. To the visitors the chief attractions were the steam-boilers on the top of the retort-benches, which Mr. Drury explained to the Association at their meeting last April, and the sulphate plant, with which he deals in his Presidential Address, published below. With regard to the boilers, one, a Cornish, was at work, and the valve was blowing merrily; while another, a Lancashire, is being placed in position, the method of doing which is to sling up the boiler, and then to build the bench beneath it. The hasty inspection over, the visitors, before leaving the works, were invited to partake of refreshments.

On returning to the town, the meeting was held in the Board-room of the Gas Company, in Fawcett Street. Mr. Drury presided over a crowded gathering. On his right were Mr. J. Stokoe, J.P., the Chairman, and Mr. G. R. Booth, the Vice-Chairman, of the Company.

Welcome to the Association.

Mr. Stokoe said that, as representing the Sunderland Gas Company, he had very great pleasure indeed in giving the Association a hearty welcome to Sunderland. They were glad to see them, especially as Mr. Drury was their President. They were almost disposed to take it as a compliment that Mr. Drury had been elected to this position. He might say that, so far as the Sunderland Gas Company were concerned, they had had the advantage of the very lengthened service of their Secretary and Manager, Mr. Cox. He was sure they would not be surprised to hear that the Company had not been an unprofitable one. The shareholders had never had any reason to blame themselves for having invested in the undertaking; and their success had been, in his opinion—and he had been longer on the Board than anybody at present upon it—largely owing to the management of Mr. Cox. They had the advantage, for several years, of having the services of Mr. Jolliffe, who did well for himself and well for them. He was followed by an exceptionally able and exceedingly modest young man. Providence, however, did not spare him to them. They then selected Mr. Drury, who had been with them now for several years. They had had no reason to regret their choice; nor did he think Mr. Drury had any reason to do so. He (Mr. Stokoe) might say, as the members might not all know it, that Mr. Drury had wisely chosen a Sunderland lady for his wife; and he had no doubt he would realize the blessedness of this every day.

The President begged, on behalf of the Association, to thank Mr. Stokoe very cordially for the particularly friendly welcome he had given to them, and for the very excellent arrangements which had been made for their comfort. He hoped the meeting would be a great success; and, certainly, to the extent which the Sunderland Gas Company had to do with it, he was quite sure that it had already been so. He also desired to thank Mr. Stokoe for his kindly references to himself.

Apologies for Absence.

The President intimated that he had received letters of apology for inability to be present from one or two members. Mr. Bower wrote that, on account of an unfortunate accident, he regretted that he would be prevented from attending the meeting. Mr. Holliday was also unable to be present, on account of pressure of business.

New Members.

The following gentlemen were admitted members of the Association: Mr. J. A. Gray, Cleator Moor; Mr. T. Norfolk, Knottingley; Mr. W. J. Mott, Selby; Mr. J. Eadington, Blyth; and Mr. E. E. J. Anderson, Ripon.

The Late Mr. R. Wallis, J.P.

The President said that, before proceeding any further with the business, he wished to express the sorrow which they, as an Association, felt at the death of Mr. Robert Wallis, J.P., Chairman of the South Shields Gas Company, and an ex-President of the Association. Mr. Wallis died at the ripe age of eighty-nine years. He always took an active interest in gas matters. For fifty years he was a Director, and for the last forty years the Chairman, of the South Shields Gas Company. Only once, he understood, was he absent from the annual meeting during the period of his chairmanship. As a man, he was sympathetic and kindly; and he was sure he was one who left this world better than he found it.

Workmen's Insurance; Standardizing of Meter-Unions.

The Hon. Secretary (Mr. J. H. Penney, of South Shields) read the following report of what had been done with regard to insurance under the Workmen's Compensation Act and the standardizing of meter-unions:—

It will be remembered that at our April meeting you determined that this Association should confer with other Associations relative to the Workmen's Compensation Act, with a view to ultimate steps being taken for the formation of some mutual insurance society; and the President and myself were empowered to deal with the matter.

The kindred Associations were communicated with, and asked if they would be willing to join in a conference on the subject, should the Insurance Companies fail to reduce their rates in the meantime. The Incorporated Gas Institute and the Institution of Gas Engineers were also written to; but the replies were not encouraging, except that from the Incorporated Gas Institute. Mr. Dunn, the courteous Secretary of that body, replied that arrangements would probably be made for a paper to be read on the subject at the Belfast meeting. A paper was read at that meeting; a long discussion ensued; and much useful information was elicited.

Your Committee held several meetings in May and June last, when some of the best Insurance Companies were approached with a view to obtain a minimum quotation, with a sliding scale, for the North of England. Quotations were received, in due course, from tariff and non-tariff offices; but the majority of them were very high. Ultimately, the following sliding-scale quotation from a good and sound office was accepted:—

On wages not exceeding	£100,000	..	10s. 0d.	per cent.
" "	150,000	..	9 6	"
" "	200,000	..	9 0	"
" "	250,000	..	8 6	"
" "	300,000	..	8 0	"

A circular was afterwards sent to all the Gas Companies and Local Authorities owning gas-works within the area of the Association's district, inviting them to insure under this arrangement; pointing out that "the larger the number of Gas Companies and Local Authorities insuring under this scheme, the lower the premium would be to each."

The result, to this date, has been, that, in round numbers, about forty Gas Companies and Local Authorities have insured up to about £125,000 in wages, at 9s. 6d. per cent.

With regard to the question of the standardizing of meter-unions, at the April meeting of this Association, on the invitation of the North British Association of Gas Managers to join them in trying to get a uniform standard for meter-unions established, you deputed the President and myself to represent this Association at any conference which might be held. We accordingly communicated with the North British Association, advising them that we had been appointed to confer with them, and requesting them to keep us informed of the progress of their deliberations from time to time. We subsequently received a reply, stating that a paper would be read upon the subject at the Belfast meeting of the Incorporated Gas Institute. A paper was read, and the matter was referred to the Council to consider what steps should be taken. We have not received any further communication on the subject.

President's Inaugural Address.

The President then delivered the following

INAUGURAL ADDRESS.

Gentlemen,—I beg to thank you for the honour you have conferred upon me in electing me President of this important Association for the current year. Were it not that I have the valued assistance of the Committee, I dare not have undertaken the responsibility; but with their help and your kind forbearance, I trust the interests of the Association will not suffer during my term of office.

I think we may fairly congratulate ourselves on the fact that the North of England Gas Managers' Association has this year attained its majority. It was first formed on the 10th of April, 1877, at South Shields, when our highly-esteemed friend Mr. Warner was elected first President; and the first general meeting was held in Newcastle, on Saturday, Oct. 27, 1877. As a comparatively new member, I trust I may say without undue conceit that we ought to be proud of the high position that this Association holds, and of its firm numerical and financial basis. After a healthy infancy and a vigorous and sturdy youth, it has reached manhood; having I believe suffered very little, if at all, from the complaints and ailments to which childhood is subject, or from the excesses in which youth sometimes indulges. I would not, however, for a moment wish it to be imagined that we, as members, consider no further improvement is either desirable or attainable. Representative as our Association is, there are still professional brethren in its district who have not yet cast in their lot with us; and it should be our duty and privilege to invite them to do so. There is also ample opportunity for all of us, and more particularly the younger members, to make the Association one of increasing usefulness by working for it in many ways—such as contributing papers to be read at the meetings, taking part in the discussions, and generally giving it the benefit of their experiences; and when I say experiences, I mean those of failures as well as those of successes. I must admit that it requires courage to chronicle one's disappointed hopes and abortive actions; but it will be readily conceded that a man who is able to calmly and dispassionately review his errors of judgment or misfortunes, will not rest content until matters are placed on a more satisfactory footing.

Speaking on this important occasion, the 21st anniversary of the first general meeting of the Association, I labour under the great disadvantage of being unable to claim 21 years' personal acquaintance with gas manufacture. I cannot therefore rely on my own observations in comparing the condition of things then and now. Thanks, however, to an excellent technical press, this defect can to a certain extent be overcome.

Looking back upon the period named, one thing, I think, is certain—viz., that among gases coal gas continues to hold the field as an illuminant and heating agent. In this country, at any rate, gases made from other substances than coal serve only as hand-maids to their mistress coal gas. Carburetted water gas and oil gas, useful as they no doubt are as auxiliaries and enrichers, are relegated to a very secondary position in the economy of gas manufacture. Continuing the retrospection still further back, one cannot help being struck, when considering the process of manufacturing coal gas, at the remarkably able manner in which the pioneers of our industry laid their plans and designed their apparatus; and glancing backward over the period of this Association's existence only—a period which perhaps has never been surpassed for fertile imagination, for inventive genius, and for the harnessing of nature's forces for the service of mankind—is it not wonderful that, in their essence, the production, purification, storage, and distribution of coal gas have not undergone any fundamental change? Improvements in details there have, of course, been; but the methods remain the same. Broadly speaking, all economies effected have been obtained by means of improved methods of handling material—such as machine stoking, inclined retorts, conveying machinery, and labour-saving appliances generally. Unfortunately all the genius of the gas profession during the past 21 years has not yet satisfactorily disposed of two great annoyances to which gas managers are subjected—I mean stopped ascension-pipes and naphthalene deposition—and that these two matters are a source of endless worry and bother, few will be inclined to dispute. I know, of course, that cures for stopped pipes have been tried and found more or less successful in certain cases, and that the formation of naphthalene can be prevented by the use of oil vapours. But do these remedies in either instance go to the root of the matter? I fear not.

Turning to the efficiency of coal gas as an illuminant, what a revolution in the candle duty has been brought about in the last two decades—or, as a matter of fact, in far less time than that. Who among us, even a few years ago, would have ventured to prophesy a duty of nearly 30 candles per cubic foot of gas for burners consuming as little as $\frac{3}{4}$ cubic foot per hour, and upwards? To Dr. Auer von Welsbach the gas industry owes an incalculable debt of gratitude; and may we hope the gratitude is of that quality which conveys a lively sense of favours to come in the shape of a more robust mantle.

Here perhaps I may be allowed to touch a weak point in our methods, and one which it is high time that we remedied. I refer to the supineness of gas undertakings in popularizing the use of gas. Are not consumers left to themselves far too much in the application of gas as an illuminant and heating agent? Do not they (the consumers), through ignorance or want of thought, squander the wealth of hydrocarbons contained in their supply of gas by the use of ancient and unprofitable burners, niggardly service-pipes, and badly-arranged fittings? Where are the officials appointed by the gas undertakings whose duties it should be to educate the popular mind on these subjects? I am afraid in the very large majority of cases, echo still answers "Where?"

Twenty-one years ago, electric light was just beginning to make itself felt as a force to be reckoned with; and everyone remembers the scare produced among gas shareholders about that time. Prophecies were heard on all sides that the reign of gas was over, and that it, and all its works, would very soon be relegated to the limbo of oblivion. Time, as less hasty judgments foresaw, has proved otherwise; and the electric light, with all its improvements and cheapened production, has not yet ousted us from our position. There is a vast and ever-increasing field for both commodities; and the electric light, though not to be despised or underrated as a rival, is not feared, but rather welcomed as a pioneer of improved lighting, and a creator of a desire for yet more light.

The past twelve months have not been devoid of topics of exceptional interest to us. A year of great national commercial prosperity, the cost of raw materials has naturally gone up by leaps and bounds. Manufacturers of gas, however, feel the bad effects of such general prosperity; for coals, iron, bricks, and labour are dear, and often bad at the price, and, except in districts containing an unusually large proportion of factories and workshops, there is no commensurate increase in the consumption of gas. Very few householders or shopkeepers burn less gas because times are bad, or more because they are good.

As I have said, the general tendency of prosperous times is to send prices up; but in the matter of gas our interests are all the other way. Unfortunately, we are beginning to associate good times with labour troubles; and, though now both have happily terminated in peace, it will be many years before the disastrous effects of the great engineers' strike and of the Welsh coal strike cease to be felt. So much interest has been centred in these two industrial wars, that it would be only waste of time for me to mention any of the details connected with them. But when one realizes the time wasted—seven months in one case, and five in the other—and also the immense sums of money lost to the community at large, one is appalled. In the case of the coal strike, I saw it mentioned a few days ago that the ascertainable loss due to it was estimated at £7,000,000.

Most of us will have asked ourselves what is the remedy for these suicidal misunderstandings. Is the prosperity of the country to be imperilled and wasteful strikes and lock-outs indulged in right up to the close of this so-called enlightened nineteenth century? Of one thing, however, I feel sure, and that is the absolute futility of compulsory State intervention, for which, in crises like those mentioned, certain sections of the public are so ready to clamour. Whatever might be done in Germany and in other semi-despotically ruled countries, no government in our country will be able to compel a man to sell his labour for any less price than he may think fit to put upon it, or, on the other hand, to force an employer to pay more for labour than he can afford to do, or to run his business at a loss. No; in my opinion there must be a better understanding between employer and employed before disputes can be settled in a more satisfactory manner. There appears to be a want of confidence between labour and capital—the men mistrust the masters and the masters the men.

Workmen as a rule have no interest in a business beyond getting as much out of it as they can with as little effort as possible; and increased energy on their part does not, directly at any rate, bring them any advantage. Surely then, if this be the case, the cure for strikes lies in the direction of co-operation in some form or another. Under this system, employer and employed have the same interests, and will pull together instead of against one another. In so doing the mutual confidence, which is now so lamentably deficient, will be restored, and disputes (if any) arising will be amicably settled. Fortunately we are not left entirely to speculate on what the results of such a cure would be. We have many examples of co-operation around us; and one especially interesting to us, in the form of profit-sharing, is seen in the case of the South Metropolitan Gas Company, of London, where, under the fostering care of Mr. George Livesey, its success is beyond all doubt. We shall watch with interest the result of the latest development of the South Metropolitan scheme—the Workman Director. This move appears to be the logical conclusion of the system; but the carrying out of the idea presents many difficulties.

A great deal has been written and said of the probable effect on the industries in this country of the Workmen's Compensation Act, which came into force on the 1st of July last; but there is no doubt that the disastrous results which in many quarters were predicted have been found to be very much exaggerated. Mr. Chamberlain stated that the principles of the Act were: That every workman is entitled of right to moderate and reasonable compensation for all accidents happening to him in the course of his employment, unless caused by his wilful default; that this compensation should be a charge upon the employment in which the accident occurs; and that it is not a fine upon the employer, but a recognition of the just claim of the workman. Many people insist that the tendency of the Act is distinctly socialistic; but, as Lord Salisbury observed in the House of Lords, it was the late system that was socialistic, inasmuch as it threw upon the rates the charge of maintaining the sufferers from industrial accidents. In any case, few will deny the justice of making reparation to a workman who, while in the pursuit of his calling, meets with a serious accident—thereby, at one stroke perhaps, losing possibly the whole of his capital, invested as it is in health, muscle, and activity. Manufacturers who use machinery must be prepared to make good any defect which may arise in it or mishap which may occur to it through neglect or some unforeseen cause; and, in the same way, I think this Act provides for accidents to the flesh and blood machines to which we owe so much. The passing of the Act produced something akin to a panic in many of the centres of commerce in this country, notably in the coal and iron trades; but, to show that such a state of things was not warranted, I may perhaps be allowed to quote from an article in "The Times" of Aug. 12 last. It says—

> The arrangements which colliery owners have already made, either mutually *inter se* or by insurance with public companies, have justified the belief that a penny per ton all round will be likely to fully meet the provisions of the Act; and this sum applied to the whole coal industry of the country will work out to an annual expenditure of £840,000. Now in some districts the provision already made for meeting accidents, &c., is so considerable that this burden, if merged in that already borne, will not be nearly so serious as it would otherwise have appeared to be. It was, at one time, anticipated that the Compensation Act would add about sixpence per ton to the cost of producing pig iron; and it was grimly prophesied that this last straw on the top of dearer minerals and foreign competition would completely break the camel's back. Fourpence of the amount stated was expected to be added through the increased cost of coal; and the other twopence was expected to take the form of insurance premiums for the pig-iron industry itself. It now turns out that some districts have been able to effect insurance with public companies at as low a rate as one halfpenny per ton of pig iron produced, and that the increased charge made through coal does not exceed another three-halfpence; so that twopence per ton of pig is an outside figure—being one-third or less of the amount originally talked about. It comes in short to this—that the Compensation Act of 1897, like the Employers' Liability Act of 1880, has been much less harmful to our great industries than was expected.

In our own case, alarm was felt at the almost invariable quotation by the Insurance Companies of a 25s. per cent. rate for gas-works; but, thanks no doubt in a large measure to the action of this Association on the initiative of Mr. Bower, any gas undertaking may through it obtain relief from the risk and annoyance of the Act on the payment of an annual premium of not more than 9s. 6d. per cent. on their wages bill. All the larger gas undertakings, however, will probably be justified in taking their own risk; in which case Mr. Chamberlain's estimate of 5s. per cent. will possibly be found to be over, rather than under, the mark. One cannot blame the Insurance Companies for looking after themselves, especially where the risk is to a great extent a very uncertain quantity. But they will probably have themselves discovered by this time that the chances of accident in gas-works are much less than those in iron-works, ship-yards, &c.; and that there is no extra danger to life and limb in the proximity of a gasholder or two. In considering its scope, it must not, however, be forgotten that the Act is experimental, and at present embraces only half the labouring population of the kingdom.

Probably there are few gas undertakings in the country which are not now beginning to feel the effects of the large increase in the cost of coal. For a long time prices have ruled so low that we have been in danger of thinking they would never get up again. Fortunately our bye-products, with the exception of tar, are commanding fair prices. Sulphate of ammonia is now higher than it has been for a number of years; and it is sincerely to be hoped that the market will continue to improve. The Sulphate of Ammonia Makers' Committee, formed about a year ago, has been busily at work, and may possibly have had a share in bringing about this result. Its object is to encourage the use and application of sulphate. It has offered prizes for the best grown crops of various sorts raised with the aid of sulphate; has disseminated literature on its fertilizing properties; and is about to offer a prize of £500 for the best essay on the utility of sulphate as a fertilizer. Such a society should be patronized by all gas concerns; and though the report of the first year's working is not very encouraging, the continual bringing of such information before the farming and agricultural classes must make itself felt in time. Whether or not the address of Sir William Crookes to the British Association last month on the importance of nitrogenous manure for wheat-growing will increase the demand for sulphate, it is difficult to say; but it very possibly may result in diverting for the use of this country many of the thousands of tons of this article which are annually exported to the Continent.

In connection with the manufacture of sulphate, makers who have hitherto simply burnt the waste gases and passed the products up a chimney are being impressed by the inspectors under the Alkali Acts with the fact that the law enjoins that they must take the "best practical means" to render the sulphuretted hydrogen evolved from the still innocuous. I believe I am correct in stating that the inspectors acknowledge three "best practical means," which are as follows:—

1.—Conversion first into sulphurous acid, and finally into sulphuric acid in vitriol manufacture.
2.—Conversion into sulphur by means of the Claus kiln.
3.—Absorption in oxide of iron.

Of these three processes, the first is decidedly the best, and, in the long run, the most economical. But it entails a large amount of supervision and even a skilled staff of its own; and the plant is costly and occupies considerable space. The Claus process is much less intricate, and is said to require very little attention; but the product, which should realize a sufficient sum, if pure, to at least pay the interest on the cost of the plant, is, in the case of sulphur produced from gas liquor, of such a bad quality that, unfortunately, it is almost unsaleable. One of the inspectors, when reporting on the manufacture of sulphate in his district, stated that he knew of no case in which the Claus process showed a profit. Both these processes are suitable for large gas-works; but when we come to small ones, there is no doubt that the oxide purifier, with revivification *in situ*, is the simplest and the best. It is stated that this method deals very satisfactorily with sulphuretted hydrogen from sulphate plants turning out not more than 300 tons of sulphate per annum; but when this amount is exceeded revivification becomes very patchy and irregular, the oxide often fires, and the purifier becomes unmanageable. If, on the other hand, the purifier is emptied every time it is fouled, and the oxide laid out to revivify, the cost of labour is very serious.

Another method which has the approval of the inspectors is now coming into use, and is finding favour in gas-works which are too large for the absorption by the oxide method, and where the other means are considered undesirable. I mean what is known as the "limestone tower" process—an installation of which has just been erected at the Sunderland Gas Company's Hendon

works. In it the sulphuretted hydrogen is first converted into sulphur dioxide by complete combustion in a furnace specially designed to retain its heat. The gases are then cooled and led into the bottom of a tower filled with tiers of limestone, through which the gases pass. The sulphur dioxide combines with the limestone, forming bisulphite of calcium, which, being soluble, is washed out by a shower of water from the top, as in an ordinary scrubber; and as the limestone wastes away fresh is supplied through suitable openings in the tower. In this process, there is no bye-product or residual, and there is a charge on the manufacture of sulphate for limestone and labour; but the simplicity of the apparatus and the comparatively small first cost quite counterbalance these disadvantages.

As to tar, the outlook seems hopeless indeed, and prices have, I believe, never been lower than those quoted lately. We must not, I fear, expect much, if any, benefit from Dr. Lilienfeld's discovery of the means of artificially producing albumen from tar products; for, as was stated in an article in the "JOURNAL OF GAS LIGHTING" a few weeks ago, with the discovery of more and more useful products obtained from it, the value of tar gets less and less. If, then, there is anything in the Vienna Professor's discovery, tar distillers may well cry out to be saved from their friends.

I mentioned a few moments ago the existence of a Sulphate Makers' Committee; and this reminds me that another society has been very recently formed, or rather re-formed, which should prove of great assistance to the gas-making fraternity. It is the Gas Companies' Protection Association; the aims of which are to protect the property, revenues, rights, and privileges of gas companies, to secure united action, and generally to keep members informed of all parliamentary and other proceedings affecting their interests. Such an Association is surely worthy of support.

A feature in the present-day methods of gas manufacture is the variety of means to our hands of enrichment. Only a few years ago cannel coal was the almost universal agent for this purpose; but this commodity becoming scarce, and consequently expensive, necessity became the mother of invention, and we now have at least half a dozen processes as substitutes—such as the Peebles oil and the oxy-oil processes, enrichment by benzol and petroleum vapours, and by admixture with carburetted water gas of high candle power, &c. Acetylene, that most brilliant of gases, may some day perhaps be used for enriching; but carbide of calcium will have to become very much cheaper than it is at present before this gas can be so employed. I understand that the cost of enrichment by means of acetylene is about 6d. per candle per 1000 cubic feet; and, in addition to this, it is very difficult to mix the two gases, owing to their different densities.

The use of carburetted water gas as an auxiliary in the manufacture of coal gas is coming more and more into favour; and quite a large proportion of the gas undertakings in the kingdom are now supplying 25 to 30 per cent. of it. The advantages of having a plant for the production of such a gas are so well known to the members of this Association that I will not venture to recapitulate them. The outcry against the increased percentage of carbonic oxide in the mixed gas supply is largely a matter of sentiment, and has been shown to be without any serious or substantial foundation; but since a Home Office Committee has been appointed to look into this matter, I fear that another instance of grandmotherly legislation may result. Should the proposal of the Committee as to the restriction of the amount of carbonic oxide during the hours of night ever assume legal force, the lot of the gas manager, who has to guarantee not more than a certain percentage of this gas in the outskirts of his district at stated times of the day, will not be a happy one.

Before bringing my remarks to a close, I should like to make a short statement on the consumption of gas in this town. Sunderland was first lighted with gas on March 9, 1824; and after some years of competitive supply in the shape of two rival Companies, the undertakings were amalgamated and formed into the Company at present existing. The Sunderland Gas Company has for the past ten years enjoyed the distinction of supplying gas at a price lower than almost any other in the kingdom. The charge ranges from 1s. 11d. to 1s. 6d. per 1000 cubic feet, according to the individual consumption; and the average price works out at 1s. 8d. The cheapness of the gas has naturally encouraged manufacturers in the district to use it very largely as a source of motive power; and at the present time there are over 300 gas-engines in use in the town of all sizes ranging from $\frac{1}{8}$ to 50 horse power nominal. The engines of very small size are used principally for driving sausage machines, coffee grinders, lathes, printing and mineral water machinery, hoists, &c.; while the largest are found chiefly in ship-yards and engine shops, in many of which no other motive power is used. One or two firms on the Wear have each as many as ten gas-engines, with an aggregate of fully 450 indicated horse power; and in a great many works steam is being rapidly replaced by gas.

Mr. H. H. Wake, M.Inst.C.E., the Chief Engineer to the River Wear Commission, a few years ago introduced gas-engines for driving the pumps in connection with two large graving docks under his charge; and the installation has been an unqualified success. Five 40 nominal horse power gas-engines—two for No. 1 dock and three for No. 2 dock—are employed for this purpose; each connected direct to a 22-inch centrifugal pump, with 66-inch disc, and capable of discharging upwards of 2600 tons of water per hour. The pump and engine are both contained on one base plate. In order to show the efficiency of the installation, I may say that at the trial of one set of these pumps, 10,238 tons of water were pumped out in 1 hr. 58 min.; the pump starting against a head of 1 ft. 11 in., and finishing against a head of 20 ft. 3 in., with a consumption of 6695 cubic feet of gas, and a cost of 10s. Mr. Wake was the first to introduce direct gas-engine driving with centrifugal pumps; and the result has been so satisfactory that the method has since been adopted in several other parts of the country. Besides all this, gas-engines are used at the docks for revolving a swing railway bridge and for opening and shutting a pair of dock gates; also for working a 20-ton travelling crane, the gas supply being conveyed to it by means of a 3-inch flexible hose-pipe.

Taking into consideration the amount of gas used by all the engines in the town, and also that consumed for cooking and heating, it will cause no surprise when I tell you that the day consumption of gas in Sunderland is not inconsiderable. During the week ending July 9, 1898—which is taken as being a typical summer week—the quantity of gas delivered between the hours of 6 a.m. and 6 p.m. amounted to 43 per cent. of the total consumption. This, I venture to think, will be considered a very satisfactory state of affairs; and I may say that this percentage would have appeared even higher had it not been that in many works at that time night shifts were being worked owing to briskness of trade.

And now, in conclusion, I must apologize for the absence of anything original or striking in my remarks. Presidential addresses become every year more and more difficult to prepare, and one finds oneself forestalled in every direction. I trust, however, I have not wearied you; and should anything I have said prove helpful to any of the members of the Association, I shall feel that my efforts have not been in vain.

THE POLICY OF DISCOUNTS.

A paper to be read by Mr. J. HOLLIDAY, of Scarborough, on "The Policy of Discounts," was on the agenda. The President explained that, as had been intimated, Mr. Holliday was unable to be present, but that Mr. Williams, of Scarborough, was with them, and he had kindly consented to read Mr. Holliday's paper. He had no doubt that Mr. Williams would be able also to answer any questions regarding it. The paper was accordingly read by Mr. ALFRED C. WILLIAMS, the Accountant of the Scarborough Gas Company, as follows:—

When our esteemed Honorary Secretary wrote me to the effect that all his applications or invitations for papers for this meeting had unfortunately proved abortive, it occurred to me that, although the question of the policy of a gas company allowing a discount on the gross price charged to private consumers of gas for prompt payment, is not by any means new, yet a few general remarks, together with some notes giving details of the working of, and general results obtained from, two systems of discounts from actual experience, might be of interest. Moreover it is a subject discussable from many points by all sections of the Association.

It may be as well to state here that the paper relates *only* to discounts for prompt payment, and does not touch upon the question of differential rates or discounts for quantities consumed.

I must admit I was rather surprised, on taking out from the latest issue of the Board of Trade Returns for Authorized Gas Undertakings (other than those of Local Authorities), to find that, out of a total of 60 towns in the United Kingdom where 20,000 tons of coal per annum and upwards were carbonized, in only 11 cases had the principle of discounts for prompt payment been adopted.

The system of cash payments in businesses outside gas supply is becoming more general throughout the country, especially in the larger business towns, and has much to recommend it both from the side of the seller and of the purchaser. It is evident the producer, or seller, under competition, is in a position to afford to give a much better article, under ordinary conditions, for 20s. if he receives cash down than he would be if his customer required a six months' or longer credit. Or that, if he does give equal value knowing that credit will be required, he must charge a somewhat higher price for the article in order to cover the necessary clerical costs incurred, loss of interest, risk of bad debts, &c.; and I think logically the same argument may well be applied to the sale of gas. To supply the best article we can produce at the lowest price is undoubtedly the idea to be followed; and every point in the administration of a concern, on working, distributing, clerical, and subsidiary charges must be watched and taken full advantage of, so as to reduce the total cost to the lowest possible minimum, compatible, of course, with efficient work.

With this idea, my Directors some years ago decided upon the introduction of a system of discounts for prompt payment; and recently, after having had a most successful experience with their initial system, they decided to amend it somewhat for the mutual benefit of the consumers and the undertaking itself.

It is my intention, in the first instance, to describe briefly the main principles of these two systems, and afterwards give a few figures showing the results obtained from them respectively.

The first system adopted was to allow a discount of 3d. per *complete* 1000 cubic feet of gas consumed, if the amount was paid within six weeks of the end of the quarter. The following is a specimen of the notice which was inserted on the demand-notes:—

> DISCOUNT FOR PROMPT PAYMENT.—Discount at the rate of 3d. per complete 1000 cubic feet of gas consumed will be allowed if this account be paid not later than Tuesday, the 11th of August next, after which date the discount cannot be allowed.

The system answered very well, on the whole, with the following exceptions:—

(*a*) Some consumers had the benefit of a notice extending practically the *full* discount period—viz., six weeks—which was an undoubted advantage to certain classes (particularly small consumers), while other consumers had only a few days' notice in which to provide between the date of the delivery of the account and the termination of the discount period.

(*b*) Considerable dissatisfaction, and even friction, caused through no allowance being granted on the odd hundreds; that is, a consumer naturally felt somewhat "hit" when he examined his account and found he had consumed (say) 10,900 cubic feet of gas in the quarter, and was only going to be allowed discount on 10,000 cubic feet.

(*c*) On the last two days for discount each quarter, the strain on the clerical staff at our town offices, as I will show later, was considerable, and had a tendency to lead to errors in entry, mistakes in change, &c.

(*d*) A further objection bearing upon this point was the fact that, owing to the large number of accounts received during the last few days for discount, the greater part of a week was occupied in entering, posting, and totalling the items, which made it impossible to check each day the payment into the bank with the daily total of cash received.

(*e*) It was noticed that, among the accounts outstanding after the termination of the discount period, those consumers who had had the shortest period between the delivery of the account and the last day for discount preponderated to a considerable extent.

(*f*) We experienced considerable difficulty, and I may add unpleasantness at times, especially in the June and September quarters, with consumers who, through having probably let their houses for the holiday season, and leaving no address with the Company, did not receive their accounts in time to enable them to participate in the benefit of the discount.

It may be as well to state that the Directors laid down a firm rule to the effect that under no circumstances whatever could an exception be made to anyone missing the final discount day; and this rule was strictly adhered to, with advantageous results.

The foregoing system was in operation for some thirteen years; but a short time ago, upon a reduction in the price of gas taking effect, it was decided, in order to obviate, as far as possible, the difficulties I have set forth, to amend it as follows: Discount to be allowed at the rate of 7½ per cent. (1s. 6d. in the pound) on the money value of the gas consumed, if the account is paid within *one* calendar month *from the date of its being rendered*. The notice on the demand-notes now appears thus:

> DISCOUNT ON GAS ONLY.—The above charge for gas is subject to 7½ per cent. discount (1s. 6d. in the pound), on condition that this account be paid within ONE CALENDAR MONTH from the date of its being rendered.

The benefits derived from the introduction of this alteration of systems are as follows:—

(*a*) The better distribution of the work in the office.

(*b*) Consequent on this, much less danger of clerical or cash errors arising.

(*c*) Allows cash-book to be posted *daily* throughout the year. (This has now become one of the fixed rules of the office.)

(*d*) Each consumer now has a precisely equal period between the date his account is rendered and the expiration of the time allowed for discount.

(*e*) The discount allowed being at the rate of 7½ per cent. prevents the frictions which arose over the odd hundreds under the initial system.

(*f*) Previously the collectors could not commence their "second" round, to call in outstanding accounts until at least one week after the expiration of the all-round *fixed* discount period. This meant that they had to face the whole of the accounts which had missed discount at one time. Under the amended system, the outstanding accounts fall in in sections; and this we find permits of their receiving better individual attention.

I now have pleasure in submitting a statement which I think speaks for itself as to the better distribution of the work.

STATEMENT *showing the Number of Accounts Received each Day from July 1 till the Last Day for Discount under the New and Old Systems respectively.*

NEW SYSTEM (4859 Consumers). [7½ per cent. discount if account be paid within one calendar month of delivery.]		OLD SYSTEM (4703 Consumers). [3d. per complete 1000 cubic feet allowed if account was paid within six weeks from July 1.]	
1898.	Number of Accounts Received.	1896.	Number of Accounts Received.
July 1	63	July 1	39
2 (Sat.)	35	2	33
4	59	3	22
5	52	4 (Sat.)	4
6	49	6	15
7	78	7	14
8	41	8	42
9 (Sat.)	47	9	27
11	114	10	43
12	91	11 (Sat.)	14
13	113	13	43
14	97	14	33
15	117	15	39
16 (Sat.)	55	16	69
18	114	17	76
19	80	18 (Sat.)	13
20	70	20	67
21	82	21	80
22	79	22	80
23 (Sat.)	69	23	69
25	134	24	68
26	118	25 (Sat.)	31
27	132	27	93
28	115	28	130
29	116	29	106
30 (Sat.)	84	30	71
	**	31	67
Total at end of July,	2204	Total at end of July,	1388
Aug. 1	Bank Holiday	Aug. 1 (Sat.)	47
2	104	3	Bank Holiday
3	83	4	115
4	45	5	104
5	67	6	113
6 (Sat.)	54	7	124
8	130	8 (Sat.)	82
9	73	10	480
10	75	11	607
11	106		
12	99	Total	3060
13 (Sat.)	74		
15	94		
16	55		
17	37		
18	50		
19	23*		
Total	3373		

Greatest Number of Accounts Received in One Day.

New system	134	Old system	607

You will observe that the largest number of accounts dealt with in one day was only 134, against 607 on the last day for discount under the old system. This, as you will all appreciate, was a very great point in our favour. It will also be noticed that the number of accounts received up to the end of July under the new system was greater by nearly 60 per cent. than that received under the old. This improved state of things is partly due to the fact that many of those consumers who had made a practice of paying their accounts on the last days for discount now "take time by the forelock," and pay soon after the delivery of the demand-notes, lest procrastination shall result in the "calendar month" slipping by, and their losing the much-desired discount.

Five years prior to the introduction of a discount system, the amount of bad debts per 1000 cubic feet of gas sold (excluding public lighting) averaged 0·34d. During the succeeding five years, the average decreased to 0·24d.; and the average of the past five years was 0·13d., while for the twelve months ending June 30, 1898, it had fallen to 0·10d. per 1000 cubic feet sold.

At the close of the discount period on the past quarter's accounts—Aug. 19 (the delivery of the accounts having been completed by the 19th of July)—the amount outstanding was £559, or 8·7 per cent. on the total amount due on the 1st of July. Two years ago the discount period expired on the 11th of August, when £760, or 13 per cent., was outstanding. Giving the old system the benefit of the receipts from Aug. 12 to 19, the amount outstanding was to £672, or 11½ per cent., against the figure of 8·7 per cent. quoted above.

Taking the question on the whole, I have no hesitation in supporting the statement of Mr. Newbigging, who in the last edition of his "Handbook" (p. 460) says, on the question of "Discount for Early Payment of Gas Bills," "The practice, wherever adopted, has been found highly beneficial, saving labour in collecting, and reducing the percentage of bad debts."

Discussion.

The PRESIDENT hoped the paper would lead to an animated discussion. There were differences of opinion upon the subject; and they ought to have samples of each that day.

Mr. H. TOBEY (Malton) said it appeared to him that the principle of the discount system was this, that they allowed something off accounts for present payment, instead of letting

* Last day for discount.

payment be deferred to a future period. When they looked at the discounts given by gas companies—from 5 up to, in some cases, 25 per cent.—and considered the apparently light risk, it was evident that no business man would give them. A discount of 25, or even of 10 per cent., was vastly in excess of the advantage to be gained by taking present instead of future payment. Most gas companies issued their accounts quarterly; and the consumer was probably called upon by the collector, in the ordinary way. If he did not then pay, he was allowed to run to the end of the three months—that was all. He (Mr. Tobey) thought it was a general rule that a gas bill was to be paid before the next quarter became due. If a consumer were granted discount for payment within four weeks, he thought it was evident that the company were giving more than the equivalent. Suppose the account were £100, and the consumer got £5 of discount for payment within four weeks, it was a very considerable sum to allow for receiving cash two months earlier than it would otherwise have been got in. The gas company might have gone into the market and borrowed the money, or they could have raised the money as capital to much better advantage. He supposed that a company, in giving discount, wanted to have cash in hand, so that they might work with less floating capital than they could if they allowed longer credit. But a company who allowed 5 per cent. discount was certainly making a great mistake, from his point of view. If they raised capital at 7 per cent., £100 for three months only amounted, in dividend, to something like 35s.; and thus an allowance of £5 appeared to him to be vastly in excess. It was beyond all the rates of commercial trading to give 5 per cent. discount for payment in one month, instead of in three months. Perhaps these heavy discounts were allowed more as a differential rate to large consumers. In this case it was really not a discount for cash paid promptly, but a differential rate with the condition attached that the parties who wished to take advantage of it should pay promptly. In regard to sliding-scale gas companies (he believed that the Scarborough Gas Company was a maximum-price Company) whose dividend was regulated in proportion to the price they charged, it appeared to him that discount was altogether a false method to go upon. Suppose they took 3d. per 1000 cubic feet off as discount, they would not be allowed to calculate their dividend upon the price after taking off the 3d.—they would be obliged to take their invoice price. They would not certainly be allowed to take advantage of a decrease in price by discount, because all the consumers would not be getting the benefit of it. It appeared to him there was very little advantage in a company which had a good working district, allowing a discount at all. He was rather inclined to think that they might collect their accounts—and many did so collect them—with very little trouble, in the ordinary way. The company were the only people supplying the article in the district; and if it were known among the consumers that they would not be allowed to go beyond a certain date without paying their accounts, they would pay them. There was no need for the inducement of a discount to urge people to pay their accounts, because, if they got a limited time, and knew that they would not be allowed to go beyond, they would pay up. There was another point in the paper which he noticed. It was one of the difficulties which Mr. Holliday said arose under the former system, and which he did not appear to have got rid of under the new system. That was with reference to people who let their houses. He thought they were not more likely to get payment from them under the new plan than under the old one.

Mr. E. H. Millard (Durham) said that, having been associated with a discount system in more places than one, he should like to bring a few points before the meeting. In the first case, the discounts allowed ranged up to 10d. per 1000 cubic feet, on a selling price of 2s. 10d. He was certainly disposed to agree with Mr. Tobey that this was out of all due proportion to the amount received. In another case, the discount was 9d. off a selling price of 4s. 6d. This was not such a high proportion; but still the disadvantage was there. When he went to Durham, no discount system was in vogue; but now there was. Anybody taking up the discount system must make a point of keeping firmly to the day allowed, even if the consumer should be one of his own directors. He remembered a friend of his who had an account owing, and who had gone a day beyond the time allowed for discount. His friend asked for the discount; and he allowed it. Unfortunately his friend did not keep the matter to himself; and the result was that others made similar applications. He had been exceedingly careful since then, no matter whom, not to allow discount if the time was exceeded by even a single day. The system followed at Durham was to stamp the account with the date of delivery, and also with the last date at which discount would be allowed, so that no mistake could be made by the consumer. He found that many people came in and said that they had lost their account, but that they knew it was due on a certain day. They might be prepared for this by keeping a sort of diary of the dates; and they would thus probably find these lost accounts to be, not one day, but three or four days, behind the time. They had gone largely in for posting the invoices, in order to get rid of the difficulty of some people having longer time than others. It was also much cheaper to post them, under a halfpenny stamp, than to deliver them. Another point was that where a heavy discount was allowed people were much inclined to think that the gas was dear. They would look at the 2s. 10d. per 1000 cubic feet; but not at the 10d. off. His experience of the discount system was that the very people who were behind with their payments in ordinary circumstances, were also the people who were behind when discount was allowed. They were practically the same people; and he certainly thought that, from the amount of trouble these people gave to the collector, they ought to be penalized in some form or other. He thought that a discount system was a very good one for that, provided they did not exceed a moderate amount. One of the reasons they had for adopting the discount system at Durham was the cost of collecting the money received through penny-in-the-slot meters; and he might say that they had been enabled to deal with something like 1000 slot meters, in addition to other duties, without increasing the office staff, simply by introducing the system of posting the accounts and allowing discount to the people who brought their money into the office. By sending out a certain number of bills day by day, the office work was kept very regular.

Mr. W. J. Warner (South Shields) said it appeared to have been overlooked that the discount system was not entirely in the hands of the gas companies. In his own case, there were some large manufacturers who made their own gas; and on approaching them with a view to their becoming consumers of their gas, these manufacturers said: "What price will you supply us at?" Then, of course, they had competition between these works and their own. In some cases they made arrangements which were satisfactory to both parties. Subsequently, when the Company went to Parliament, some of the manufacturers who had not joined them—people of considerable influence in the town—said: "Now, we have not given your terms nor accepted your conditions, because we have our own plant at work, and can therefore make gas at a cheaper rate than you can supply us at; but it may so happen that our plant may not be sufficient for our purposes, or it may require renewal, and then the question might be whether we should not come to you for our supply. The price should thus be somewhat approximated to the cost at which we have been making gas." Hence, a scale of discounts was forced upon them by the authorities—discounts of from 5 up to 30 per cent. Fortunately for them, they had to go to Parliament again; and they then got these rates to some extent limited. Still, their rates were high rates; they were too high—at least, so they thought. He gave them these facts in reference to South Shields because it appeared to have been overlooked that gas companies were not masters, in the matter of discounts.

Mr. J. H. Cox (Sunderland) said that they had discounts in Sunderland—varied in order to get into their net those large consumers to whom Mr. Warner had alluded. They allowed from 1d. up to 6d. per 1000 cubic feet. A man who burned half a million cubic feet of gas per quarter got it for 1s. 6d. per 1000. By these means they were enabled to fight against electricity to a certain extent, and also against other modes of producing gas for the purpose of propelling dynamos. He was inclined to think it was not a question of payment at all, but of giving a bonus to the person who used a larger quantity of gas than did small consumers. With small consumers, they had a large amount of trouble. They had four accounts to make out for them every year; they had eight or twelve inspections of the meters every year; and they had a separate service pipe, and a separate meter, for each. They had other consumers, who used £2000 worth of gas a year; and in their case they had probably only about fifty calls a year to get in this sum; and they had a very small proportion of service pipes and meters. To get £2000 from small consumers they would require some 2000 meters, 2000 service pipes, about 8000 calls of the inspector every year, and about the same number of calls of the collector. Mr. Holliday's method of giving a fresh date to every consumer appeared to him not to be a simple arrangement. He knew that it acted very well; but, as Mr. Millard said, the very people who did not pay under one condition, would not pay under another. There were a lot of people who would not pay unless there was some threat hanging over them. He found no difficulty at all in getting money under his present system, at the proper time.

Mr. Herbert Lees (Hexham) said that he had had some little experience in the matter of allowing discounts for prompt payment. They should not lose sight of the fact that Mr. Holliday's paper dealt simply with that; it did not deal with the question of discounts for large consumers. He thought that Mr. Tobey, in his criticism, had overlooked the main point for which these discounts were allowed. Mr. Tobey spoke as if the discounts were made in order to get in cash promptly, which was not the only reason. They were allowed for the purpose, also, of inducing consumers to pay their accounts at the office, and thus save the cost of collection. He took it that no such discounts as 5 or 10 per cent. would be allowed for prompt payment only. There was no doubt that by the adoption of a discount system, a saving in the cost of collection was effected, and that the saving was a considerable one. He was free to admit that the system had its disadvantages. One of these was pointed out by Mr. Millard—that the gross price of gas was always quoted as that at which they sold it, and the net price never was. It was very difficult to convince people if the gross price were 3s. 4d., that they were selling at 3s. per 1000 cubic feet. This might appear to be a sentimental, rather than a practical, difficulty; but, in his opinion, it was a difficulty which

they had. It was, for each of them, a question of the advantages or disadvantages which they would have by the system, and they would have to consider it, each for himself. His Directors had not such a strict rule as had been mentioned, as to allowing discount after the time had expired; but he dealt with cases as well as he could, using his discretion, and he never made an enemy.

Mr. J. T. JOLLIFFE (Ipswich), on being invited to address the meeting, said there was one point which struck him in regard to the matter of discounts, and that was that they could not lay down any hard-and-fast rule upon it. Personally, he was opposed to discounts. He never could see the reason for giving any discounts—beyond 5 per cent. certainly. He took it that in all their undertakings the cost of collection did not exceed 0·30d. per 1000 cubic feet; and he took it also that in most undertakings it did not exceed 0·25d. So that it appeared to him that if they gave a discount of 5 per cent., or, as Mr. Holliday did, of 7½ per cent., upon the gross price of the gas, they were giving considerably more than any saving in the cost of collection they could make by giving discount. Of course, there might be some particular case in which it would be desirable to make these large concessions; but it appeared to him that it was manifestly unfair to the bulk of their consumers, who used gas for lighting purposes only, if they gave such an enormous allowance as 5 or 10 per cent. to those who were users of gas for power only. He knew that he might be speaking upon points on which the meeting would disagree with him, because his views might seem to discourage the day consumption which they had all been trying to obtain; but it seemed to him to be forgotten that where gas was used for power or heating purposes (especially in the depth of winter), there was a considerable amount of overlapping of the heating with the lighting consumption; and they would have to make provision for this extraordinary demand upon them in the depth of winter. Therefore, their apparent gain was, as it were, swallowed up.

The HON. SECRETARY remarked that, although discounts were forced upon them at South Shields, they worked very satisfactorily. He rather admired the system; and he thought they got very good, practical benefit from it. He had looked at their accounts a day or two before, and he found that their collectors, up to the last day of the discount, collected about 40 per cent. of the rental; that on the last day of the discount they got about 55 per cent. of it, leaving a residuum of about 5 per cent. He thought it was a great saving in collection. They got a good balance at the bank four times in the year, which was very useful. Of course, there were difficulties on the last day of the discount, if 55 per cent. of their consumers called upon them on that day; but then, they could provide for this—they could put the whole of the staff on to the work. There were people—it was very tantalizing, of course—who came without their accounts, and someone had to make out the accounts afresh. Then, perhaps, the worst difficulty was with the people who came, after the last day, with all possible excuses. They generally tried to clinch their argument with the remark: "Your neighbours are not so strait-laced as you are, for my three or four days." But they had a last day; and they stuck to it. He was sorry to say that a great many of their consumers thought that the last day was *the* day. They gave six weeks to pay; and they never allowed discount after that period, because it would not be fair to those who had paid before.

Mr. JOLLIFFE asked if Mr. Penney would tell them what was the cost of collection per 1000 cubic feet.

Mr. PENNEY said he did not know that he could tell them, but it was very small.

Mr. W. FORD (Stockton) said in Stockton they had always had a uniform discount of 20 per cent. to all consumers—the largest and the smallest; and they had found the system worked very well. In a considerable number of cases the discount was lost; but it was very gratifying to know that in no case during the last 30 years had the rule as to the last day been broken through. With a gas revenue of something like £40,000, they had only one collector. About 60 per cent. of the amount due was carried to the office long before the last day for payment. The balance, he should say, was not more than 5 per cent. on the last day of the account being due. Consequently, they had, he was sorry to say, not a large balance at their bankers; but they had the satisfaction of knowing that they had the use of the money four times in the year, when they received it. Otherwise they might have to pay 6 or 7 per cent. if they overdrew their account at the bank. His opinion was quite in favour of discounts—not, perhaps, so large as they had been giving; but 10 per cent. would be found to be most serviceable to any corporation or gas company who might try it.

The PRESIDENT thought that, as time was getting on, they, perhaps, ought to bring the discussion to a close, although they could have gone on a little longer. He thought that the policy of discounts must very largely depend on the character of the consumption. What was found to be suitable in the one case, would not, necessarily, be suitable in another. Where the users of gas were of a very diversified character, a large discount was probably advisable; but, on the other hand, where the uses of gas were more general and uniform, smaller discounts ought to serve.

Mr. WILLIAMS, in replying to the discussion, said that the remarks which had been made had not been so much in the nature of direct questions as criticism of the general question. Therefore he had no questions to answer; but he thought that he might be able to clear up one or two points which did not appear to be clear. If the actual amount of discount allowed were a charge on the undertaking, and appeared on the debtor side of the accounts, as carbonizing wages or the like did, it would be a serious matter. But this was not a charge on the undertaking, in the sense that the quantity of gas used was increased by the discount. If there were no discount claimed in Scarborough, they would probably be able to sell their gas at 2s. 7½d. or 2s. 8d. per 1000 cubic feet at the outside, and still make exactly the same profits as at present. The main benefit of discounts, in his opinion, was that it brought in the money promptly; and, perhaps chief of all, they had much more pleasant relationships with their consumers. There was, in human nature, a liking to have something back, and when the consumers came and paid their money, they smiled, and left the office in good temper, on finding that there was something to get back. He had had experience of both systems; and he could speak in the highest terms in support of the discount system. As to the details of the system, they might have a fixed date for all accounts to be in by; or they might give each consumer the same length of time, which was, of course, by far the fairer method. But the principle was the same; and it would be found, he thought, to work extremely well. At Scarborough, they had not very much in the way of manufactories. Their consumers were comparatively small ones; and they had not such difficulties to deal with as Mr. Warner and Mr. Cox had referred to. They had no differential rate, because their consumers were much of the same size. In regard to the sliding-scale, which Mr. Tobey referred to, he was not able to give them an opinion upon it; but he should certainly think a fair method would be to take the price at the net rate, because, in the case of Scarborough, 92 per cent. availed themselves of the discount. But no doubt a clause in an Act of Parliament would put this right. As to the letting of houses, they found that the new system did improve matters to this extent—that in the case of those who let their houses the accounts might be delivered, and while under the old system they might only have a fortnight from the date of delivery to pay, under the new method the account might be delivered about the beginning of the month, and they might have returned to Scarborough before the month had expired. It was their experience that they required to be firm as to the final date. They had a printed form which they sent out to all, treating everyone alike, on which was the date of delivery and the calendar month; and in this way there could be no mistake as to the terminal date. As to posting the invoices, they had had the subject before them several times, but had not yet introduced the system. Mr. Cox spoke of the arrangement as to the expiry of the discount period not being a suitable one; but in his opinion it was very convenient. A note was made in the gas ledger of the dates when the accounts were delivered; and when anyone came to pay, they could easily refer to the ledger. But they found that probably not one in a hundred came without their bills; because they had on the top of the bill a printed notice that it must be produced at payment. The expense of collection was certainly reduced by the discount system; but a great deal depended upon what they took as the cost. Of course, the clerks at the counter who received the money were virtually collectors; and a portion of their time was a charge upon the collection. He thought there was no great trouble in getting to know the net price of the gas, and that it was the actual money paid, and not the amount stated in the invoice, which should be the comparative figure. He did not know that there was anything more to say, especially as time was getting on; but Mr. Penney spoke of the last day of discount being a difficulty. Well, they had this system of fixed dates; and, as they would see, they received payment of not less than 1000 accounts in two days, out of a total of 3000. After introducing the system of allowing a calendar month, the accounts fell due at various times during the month. The average number received was about 80 per day; the highest being 134, as against 607 on the last day under the old system. This, also, enabled the cash-book to be posted up daily, and the payment to the bank checked before it was made. He highly supported the discount system; and he thought that those who had once adopted it, would not go back to the system of no discounts.

VOTES OF THANKS.

Mr. H. LEES said it afforded him great pleasure to propose a vote of thanks to Mr. Holliday for having written his paper, and to Mr. Williams for having come there to read it. They were all very sorry at Mr. Holliday's absence; but they welcomed Mr. Williams as his substitute. The way he had replied to the discussion had been most gratifying to everyone. They were greatly indebted to him.

Mr. MILLARD seconded. They felt, he said, that Mr. Holliday had done his duty manfully. They were also indebted to Mr. Williams for coming forward to read the paper. He hoped that his experience on this occasion would induce him to come forward and read a paper on his own account another time.

Mr. WILLIAMS, on behalf of Mr. Holliday, expressed thanks for the kind vote.

Mr. WARNER said he was going to step a little bit out of the ordinary current of their business, in proposing a vote of thanks

to the President. The President had told them of the large number of gas-engines in use within the district of Sunderland. Some of the older members of the Association would at once go back with him, mentally, to the year of the gas exhibition in South Shields. On that occasion, they had two comparative toys of gas-engines exhibited. One they had some little trouble to get started, and to do its work, which was sawing a deal. The other they were not quite so successful in starting; and, in fact, he did not think it started at all. They put, or attempted to put, different kinds of work upon it, from a little water-pump to the operation which the other engine was performing. This was the introduction of the gas-engine to gas manufacturers. It was the year when their Association had its birth. The exhibition was a very successful one; and it was exactly the power which gave gas cooking and heating that push which it just at that time required. It was so successful that it was followed in other towns. Why he referred to this was that in one part of the address of the President he seemed to look back, to a certain extent, and to be of opinion that they had not made any great amount of progress within the 21 years of their existence. But, if they looked a little deeper, it was not so. They would see that many momentous questions had been raised since then. They were met on an auspicious occasion. He, as their first President, wished their present President God-speed in his year of office. The manner in which he had conducted their business that day was a proof that the gathering would be looked back upon as a very successful one. He had great pleasure in asking them to recognize the services of the President by a very cordial vote of thanks.

Mr. J. HEPWORTH (Edinburgh) said that he was permitted—as being, he believed, the second President of the Association—to second, as he did most cordially, the vote of thanks. Unfortunately for him, the President's address was always, by some unwritten law, supposed to be a matter not for discussion; but he could assure the President—having once been in the chair himself—that however true this might be while in the meeting, the moment they got outside they should begin discussing it in all ways. He ventured to say, in regard to the address at all events, that there would only be one conclusion at the end of their discussion, which would be that it had been one of the ablest addresses they had ever had from the chair.

The PRESIDENT thanked the members very much indeed for the extremely kind acceptance of the motion, as well as for the way in which it had been proposed. It was most gratifying to find that his efforts had been so successful. He could only feel that he did not deserve half the flattering remarks which had been made about him.

This terminated the meeting.

The members and their friends were afterwards entertained to dinner by the Sunderland Gas Company at the Palatine Hotel, in the Borough Road; Mr. Stokoe, the Chairman of the Company, presiding.

COAL AND COKE CONVEYING MACHINERY AT THE GAYTHORN GAS-WORKS, MANCHESTER.

In the course of our report upon the visit of the Institution of Gas Engineers to Manchester last week, reference is made to the new coal and coke conveying machinery which has been laid down, in connection with the inclined retort installation at Gaythorn Gas-Works, by West's Gas Improvement Company Limited; and we give below a few further details. The coal conveying plant has been running about two months; and the coke machinery was completed last Thursday.

The coal-handling plant consists of a powerful cannel breaker, capable of dealing with 25 tons of cannel per hour, and fed by a shoot leading from an overhead railway to a hopper fixed above the breaker. After the coal is broken, it is raised by an elevator, and conveyed by a band conveyor to a point opposite the gable-end of the retort-house fitted with inclined retorts. At this point, the coal is delivered into a scraper conveyor, which carries the coal the entire length of the house, depositing it at suitable intervals through outlets to the hoppers which hold the supply of coal ready for supplying the travelling charging-shoot. Below these hoppers there is a railway, on which runs the travelling charging-shoot for the several tiers of retorts.

After the coke is drawn from the retorts, it falls direct into a coke-conveyor extending the whole length of the retort-house, which contains 108 retorts, and is 186 ft. 9 in. long between the walls. This conveyor is of West's latest pattern, and is constructed with Hunt's patent roller chain, which, it is claimed, is the most suitable chain for dealing with coke and other materials which prove destructive to ordinary chains and chain wheels.

In the floor of the retort-house is set a U-section trough, 2 ft. 3 in. wide by 9 inches deep; and in the centre of this there is a renewable slide-bar, which supports the chain throughout its entire length. The chain itself has, at suitable distances apart, arms or scrapers on which the coke is carried to a point outside the retort-house; and the return chain is borne by brackets and rollers carried overhead by the buckstays supporting the retort-bench.

After the coke is removed from the retort-house by the conveyor, it is fed through shoots to an elevator having buckets fitted with anti-friction rollers, which roll up and down the elevator frame, and raise the coke and deliver it on to a screen. The conveyor itself is 220 feet long; and the elevator 62 feet.

After the screen separates the breeze from the coke, it is either delivered into a series of overhead hoppers for filling carts, or is conveyed to the coke yard. It is here delivered to another series of overhead coke hoppers, or else conveyed farther on to another portion of the coke yard. The overhead conveyor is 167 feet long; and it is provided with suitable apparatus for delivering the coke from it at any desired point.

Great care has been given to the designing of the whole of this coke apparatus, bearing in mind that the material to be conveyed is of a very destructive nature to mechanical appliances. The whole of the bearings and wearing parts have, therefore, exceptional surfaces to meet the severe conditions to which a coke conveyor is applied; and those parts which are liable to excessive wear are renewable at a moderate cost. The driving of the coke conveyors and elevator, it may be remarked, is performed by one vertical engine. The whole of the apparatus here described was designed by Mr. John West, M.Inst.C.E.

REGISTER OF PATENTS.

Mantles for Incandescent Gas-Lights.—Skriwan, E., of Vienna. No. 23,287; Oct. 11, 1897.

The patentee proposes to replace the platinum wire used for suspending the mantles of incandescent lights by a cheaper material, and has carried out a number of experiments with specially spun or twisted asbestos and metal wire—such as iron, nickel, copper, silver, and their alloys. Spun or twisted asbestos has been found to partly serve the purpose; but it is not durable enough, and renders the transit of the mantles (particularly when placed upon wire frames) impossible, "all the more as the gelatine used to stand transit injures the asbestos." He therefore proposes using metal wire with a covering of asbestos "wrapped, spun, or plaited" around it, and which, it is said, "perfectly resists the temperature generated by the bunsen flame, and prevents the cracking of the gelatined asbestos."

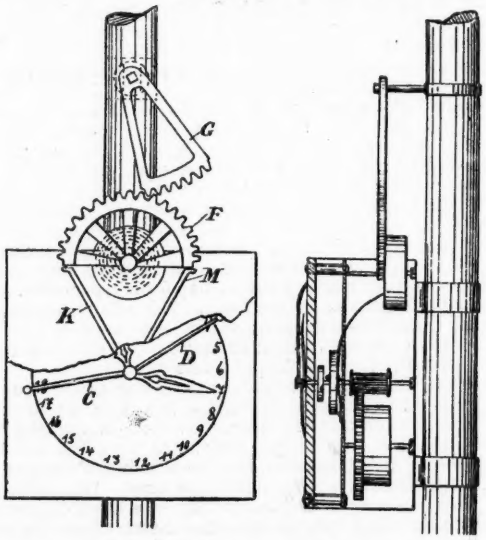
Self-Lighting Gas-Burners.—Grundy, F. B., of Palmer Street, Westminster. No. 25,127; Oct. 29, 1897.

This self-lighting burner is so arranged that, on turning on the gas, it becomes ignited by playing on platinum or other suitable material. The stopcock has passages so arranged that in one position it cuts off the gas supply; and in another position it allows the gas to pass to a jet at the side of, and somewhat below, the main burner. Above this jet is situated the platinum or other material, on which the gas plays. On the jet becoming ignited, the cock is turned farther, so as to pass gas to the main burner; and, on it being ignited, the cock is turned to such a position as to maintain the main light but to extinguish the jet light. In this way the platinum or other igniting material is not subject to the action of gas, except when requiring to ignite it in the first instance.

Self-Lighting and Extinguishing Devices for Gas-Burners.—Landauer, R., of Berlin. No. 30,652; Dec. 28, 1897.

This is a device, says the patentee, making it possible "for a lantern having been lit by self-action at a certain time in the evening or night to be extinguished in the same manner in the morning."

For this purpose two regulating devices are provided—one to open the gas-jet, and the second to close the jet and extinguish the light. Both devices work in connection with a toothed half-wheel, which gears with a sector rigidly connected with the pivot of the gas jet. C is the device for lighting and D for extinguishing the light. The works of the clock



actuate the toothed half-wheel F. G is the sector referred to above; while K is the checking device for lighting, and M the device for extinguishing the light.

This "time-gas-jet opener and closer" has the following action: The regulating hand C, which determines the time of lighting, is turned on to

the hour at which the gas is desired to burn—for instance, 6 o'clock, or the eighteenth hour of day—and the extinguishing hand D is put on the hour at which it is desired to extinguish the light. As soon as the hour for lighting is reached, the checking device K will be discharged, and the toothed half-wheel F is rotated. At the same time the sector G is rotated, compelling the cock to turn on the gas. The sector remains in the same position until the extinguishing of the light is desired, say, at 4 o'clock in the morning. As soon as the hand reaches this hour, the checking device M is released, so that the toothed half-wheel F rotates again—this time making a backward motion—by means of a spring, counterweight, or similar device. The sector is then again taken along, compelling the gas-jet to close, and the flame to be extinguished.

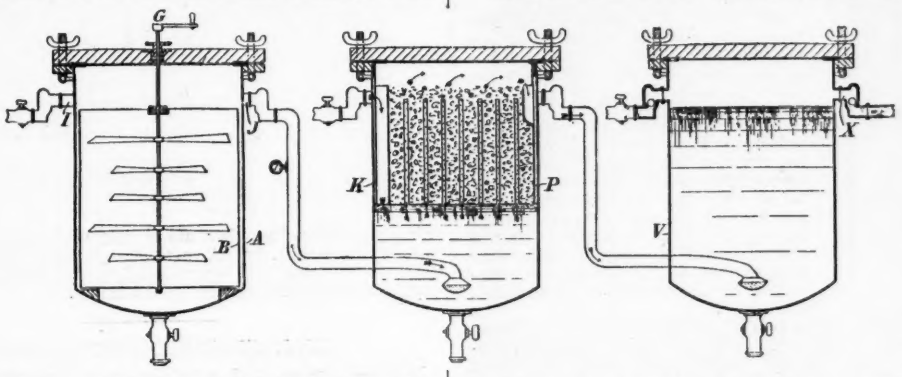
Producing and Purifying Acetylene Gas.—Walker, H., of Dublin. No. 4352; Feb. 22, 1898.

This invention relates to apparatus for the simultaneous production of acetylene and carbonic acid gases and their purification.

The patentee proposes to use a vertical and lead-lined generating cylinder A, having within it a bucket B, in which is a mixer or agitator of any suitable kind—such as a vertical rod or spindle having paddles thereon. Provision is made at G for rotating the spindle either by hand or power. At the bottom of the cylinder is a suitable outlet for emptying it; and near the upper end (and on the opposite sides) are pipes—one I for conveying into A the water to be used in the process of making the gas (and also for flushing when required), and the other J for the exit of the gas to the purifier K—provided with check-valves to prevent the gas flowing back. The pipe J enters the purifier K near the bottom.

The purifier consists of a vertical cylinder containing water at the bottom. About one-third up is a ledge, on which is a ring to prevent the gas from passing up the sides. On the ring rests a copper bucket P, containing upstanding perforated copper tubes (sealed at the top), surrounded with sulphate of iron or any other suitable crystal. At the top of the bucket is another rubber ring, so as to compel the gas to pass through the tubes and come in contact with the crystals. From the upper part of K leads off a pipe conveying the gas to a cylinder V containing water, and thence by the pipe X to the gasholder.

The apparatus is charged as follows: In the generating cylinder A



calcium carbide, chalk, or equivalents, and a suitable dry acid (such as oxalic acid), or calcium carbide and a dry acid only in proper proportions, are placed. The purifier K is packed with sulphate of iron (green vitriol) or other suitable material, or with a mixture of sulphate of iron and copper filings. On turning on water to the generator, the gas will be produced and pass to the purifier, and then into the cylinder V containing water, "which may or may not be impregnated with any substance for the better purification of the gas."

Controlling Bye-Pass Burners.—White, C., of Blaenavon, and White, T. H., of Cwmbran. No. 5342; March 4, 1898.

This invention refers to self-lighting burners in which a jet of light is formed by means of a bye-pass which opens as the main supply closes, and closes while the main burner is alight. It consists of an inlet-nozzle, above which is a gas chamber; and a horizontal flexible diaphragm divides the chamber from the air chamber above it. Through the diaphragm, and attached to it, passes the open lower end of a tube, which rises vertically through a second flexible diaphragm (much smaller than the first) over the air chamber, and ultimately penetrates a fixed horizontal plate, and is closed at its upper end. This tube is so attached to the two flexible diaphragms that it rises and falls with them according to the pressure of the gas. At the upper end of the vertical tube are holes for the escape of the gas; and above and below the holes are fixed two cone-shaped stops which engage alternately with the horizontal plate. The plate closes the entrance to the main burner; and the stops are so arranged that when the gas is turned on, and the diaphragms rise, the perforated part of the vertical tube rises above the horizontal plate, and so allows the gas to pass upwards to the burner. When the gas is turned off and the diaphragms fall, the perforated part of the vertical tube sinks below the horizontal plate, and the gas passes only to the tube leading to the flash-light. A bye-pass in the tap permits sufficient gas to flow to feed the flash-light. An air-hole, the size of which may be regulated, is formed in the air chamber, and allows the lower diaphragm to work as slowly as is required to ensure the necessary time for the transfer of the ignition from the flash-light to the burner and *vice versâ*.

Making Gas.—Liddle, J.; a communication from L. O. Triebel and D. Whiteis, of Oconto, Wis., U.S.A. No. 7427; March 28, 1898.

This invention relates to apparatus for making gas—more particularly intended to be set up for use in dwellings, office buildings, and the like. Among the objects contemplated are: (1) The provision of an improved construction to secure a uniform pressure of the gas in the distributing holder. (2) The automatic regulation of the quantity of gas admitted to the holder. (3) The arranging of the pump mechanism and gas-generator within the initial water-tank, "whereby compactness in the arrangement is secured. (4) Provision for securing an even temperature of water within the initial water-tank. (5) Provision of an improved construction of gas-generator. (6) An improved combination between the pump mechanism and the initial holder. (7) An improved form of construction of the initial water-tank, wherein an interior wall is provided, forming an annular chamber for the reception of oil.

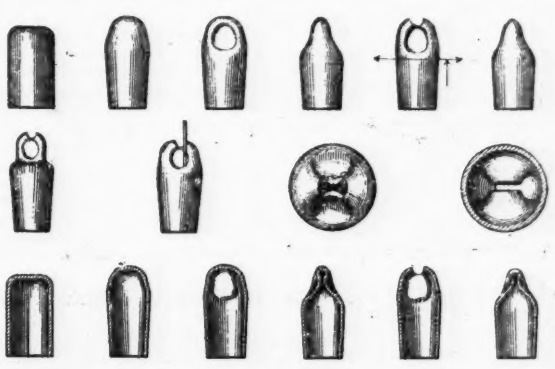
Composition for Automatically Lighting Gas—Rosinski, S., and Ducruix, E., of Paris. No. 7280A; March 25, 1898.

This invention relates to a product which "possesses the property of being rendered incandescent by the action of a jet of gas directed upon it—the incandescence being due to the condensation in its pores of a considerable proportion of the gas, the heat thereby developed being sufficient to ignite the gas." The product consists, essentially, of gelatinous alumina impregnated with platinum chloride; the invention "being particularly characterized by the employment as a support for the platinum salt of the gelatinous alumina, which has the property of possessing very great power of condensation." The product is prepared by immersing gelatinous alumina in a solution of platinum chloride, in the proportion of 1 gramme of platinum chloride to 4 grammes of alcohol. After having been steeped in the platinum chloride solution, it is brought to a temperature of about 120° C., and is then ready for use.

The composition, owing to the rapidity with which it can be rendered incandescent under the action of a jet of gas, may be employed for the manufacture of gas lighters in the form of matches, but capable of being used over and over again. For this purpose, the match-stems are tipped with a small quantity of the material; and, in order to light a gas-jet, it is only necessary to turn on the gas, and hold the tip of the lighter in the jet of gas. The composition then at once becomes incandescent, and develops sufficient heat to ignite the gas.

Gas Tips or Burners.—Porter, W. H., of New York. No. 12,227; May 31, 1898.

In explanation of his invention, the patentee says: "Heretofore it has generally been the practice to provide tips or burners with two classes of openings for the passage of the gas—one in the form of a slot extending transversely across the top of the tip to a greater or less extent, and the other in the form of two holes usually set opposite to each other; and one of the objects of the present invention is to provide an improved form of opening for the gas, which is neither a simple slot nor two holes, but which may be said to comprise in a general way a combination of these two forms, in that there are practically two holes connected by an intermediate slot or (otherwise expressed) a continuous transverse slot having

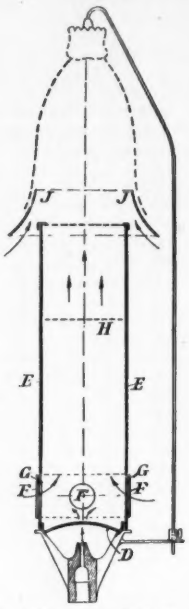


enlargements at its ends. The enlarged portions are arranged at any desired angle to the connecting transverse slot; and they preferably extend above it. The opening also is preferably formed out of a right line—that is, the holes or enlarged portions are arranged opposite to each other at a greater or less angle, and extend above the connecting transverse slot. Again, the tip is formed so that the opposed openings or enlarged ends of the slot are in communication with what may be termed "conveying channels" extending from the chamber or body of the tip; and these channels communicate with this chamber at all points throughout their length—being what may be termed open channels with their ends or openings facing each other.

The making of the burner—from the metal thimble from which it is drawn to the finished and pierced tip—is illustrated in the accompanying engraving reproduced from the specification.

Incandescent Gas-Burner.—Boult, A. J.; a communication from G. Delin, of Brussels. No. 14,454; June 30, 1898.

This invention relates to an incandescent gas-burner "characterized by the improved position of the inlet for the gas relatively to the mixing chamber, whereby air is drawn in a rotary manner, producing a richer and more powerful mixture."



The gas enters through a jet of cylindrical shape, and passes through a central aperture made in the arched cover D, which closes the bottom of the tube forming the mixing chamber. This tube E is provided at its lower end with perforations F for the admission of air, and closed or opened to a greater or less extent by the movement of a regulating ring G, also provided with openings. It is provided with a metal netting or perforated plate H at the top forming a cap.

The novelty of the arrangement consists chiefly in the arched bottom D, called "a suction plate," provided with a central orifice through which the gas enters the mixing chamber. It is essential that the diameter of this orifice should be larger than that of the gas-outlet, in order to produce a rotary motion in the lower part of the mixing chamber, and consequently considerable suction of air through the orifices F. The mantle does not rest directly on the top, and does not lie close to it, but on or over a funnel-shaped part J of larger diameter than that of the tube E. The mantle is suspended by a rod secured to a bracket of the tube E.

It will be seen that the burner chiefly differs from others hitherto known by the arrangement of the gas-outlet relatively to the tube E constituting the mixing chamber; the escape of gas taking place in a cylindrical jet in front of a suction plate provided with a central hole of a larger diameter than that of the gas-outlet—the air-inlet holes being arranged above the plate. The result of this construction is "a considerable reduction of the consumption of gas, and a phenomenal increase of illuminating power."

Treating Calcium Carbide so as to Retard the Production of Acetylene Gas.—Dillberg, G., of Sydney, New South Wales. No. 15,212; July 11, 1898

The aim of this invention is to dispense with any mechanical contrivance for the production of acetylene from calcic carbide, and to use the calcium "in its most simple and effective form"—viz., by simply immersing it in water. Instead of using mechanical devices for this purpose, a "calcium carbide admixture" is employed to retard the liberation of the gas. To make the admixture efficient, it is necessary for it to be intimately combined with the calcium carbide, by introducing the foreign substance evenly among the particles of which the solid calcium carbide is composed—an operation which necessitates bringing the solid calcium carbide into granulated or powdered form, so that minute portions of the foreign substance are interposed between the carbide particles. The "foreign substance" must, of necessity, be of a more or less adhesive nature, either in its normal state or when heated or liquefied, so that "when all the ingredients are intimately mixed, a plastic composition of even and semi-solid consistency is obtained." This plastic composition, if left for a time, solidifies; but before such solidification occurs it is placed in a mould and considerable pressure is exerted upon it, whereby it is moulded into "a cake of smooth and glossy appearance, and of great hardness and even consistency."

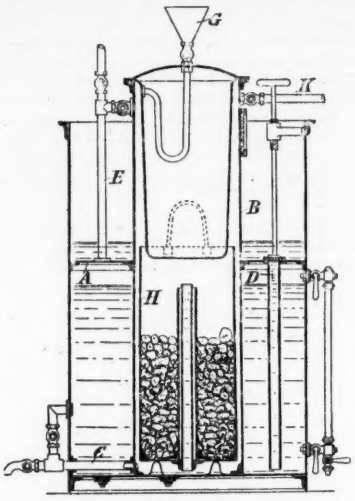
Though many substances may effect this purpose with a more or less good result, either singly or combined, the patentee prefers a mixture of naphthalene and resin, the proportions of which depend upon the quality of the ingredients employed, as well as upon the size and number of burners used and pressure of gas required. Where a burner consuming (say) ¼ foot of acetylene per hour is used, the proportions of the mixture are (approximately): 10 naphthalene, 3 resin, 45 calcium carbide. To obtain the ultimate mixture, the naphthalene and resin are reduced to a liquid form by heat; and into this liquid the crushed carbide is stirred until the composition attains a semi-solid consistency. It is then placed in a mould and compressed. When removed from the mould, it is ready for use, and may be dropped into any receptacle containing water; the only essential feature with such a receptacle being that it must be furnished with a tight-fitting cork or stopper, supplied with a hole to take either a burner direct or a pipe communicating with a burner or burners.

Acetylene Generating Apparatus.—Henriquez, E., of Brussels. No. 15,020; July 8, 1898.

This invention relates to the class of apparatus for generating acetylene from calcic carbide in which water is supplied to the carbide and an excess of gas pressure stops a further supply of water, so as to reduce or stop the production of acetylene.

The annular water-tank (formed with a central well B) is divided by a partition A into a lower gas-tight compartment and an upper compartment which may be open. From the lower portion of the compartment a pipe C leads to the inside of the well; a branch-pipe being arranged to discharge water from the compartments or well into a drain. From the partition plate, a pipe D descends to near the bottom of the compartment, and a valve is arranged by which the inlet to the pipe can be closed. A pipe E ascends from the partition, leading to the gas-main or holder, if one is used, and a branch-pipe connects the rising pipe E with the inside of the well.

The well B forms the generator. It is closed by a gas-tight cover made hollow and very deep, for the purpose of reducing the air-space in the generator. To the top of the cover a cock is fixed, surmounted by a funnel G, and communicating through a syphon-pipe with the inside of the generator. Below the cover a pipe K is fitted to the side of the well leading outside the building in which the generating apparatus is placed,



or into a chimney flue. Into the generator a bucket H is placed fitted with handles to lift it by. A stand-pipe passes water-tight through the bottom of the bucket, and is surrounded by a perforated pipe; the carbide being contained in the annular space round it.

APPLICATIONS FOR LETTERS PATENT.

19,829.—Pomeroy, B. H., "Coin-meters." Sept. 19.

19,838.—Strachan, J., "Hydrant with radial disc-valve, for street water-mains and the like." Sept. 19.

19,845.—M'Intire, C. S., "Generating acetylene gas." Sept. 19.

19,849.—Schröder, W., "Process for obtaining yellow prussiate of potash as a bye-product in the destructive distillation of coal." Sept. 19.

19,951.—Seiler, E., "Electrical gas-lighters." Sept. 20.

19,986.—Brown, A. O., and Allen, W. A. G., "Recuperative gas-lamps." Sept. 21.

20,017.—Pierron, L., "Automatic ignition of gas issuing from burners furnished with incandescent mantles." Sept. 21.

20,057.—Wallin, B. H., and Wendel, Count R. de, "Improvements relating to carbide cartridges." Sept. 21.

20,122.—Wallin, B. H., and Wendel, Baron R. de, "Generating acetylene gas." Sept. 22.

20,127.—Jacot, L., "Manufacture of acetylene gas." A communication from E. Pellaton. Sept. 22.

20,273.—Boult, A. J., "Bunsen burners." A communication from E. Verbeke. Sept. 24.

High Wycombe Gas Company, Limited.—At the recent half-yearly general meeting of this Company, the Directors reported that the profit realized in the six months ending June 30 justified them in recommending a dividend of 5½ per cent. for the half year on the ordinary shares (making 11½ per cent. for the year), and of 4 per cent. on the additional shares (making 8½ per cent. for the year), free of income-tax. They remarked that the period of abnormally high temperature which commenced in December, 1897, and extended throughout January and February of the present year, did not depreciate the half-year's working results; but that, on the contrary, the net increase in the gas manufactured was 4,216,100 cubic feet, or nearly 10½ per cent., as compared with the corresponding six months of 1897. The Company have now out on hire some 435 gas-cookers and 557 slot meters, which accounts for the above-mentioned results. The extensions, for which new capital was raised, are now completed and at work, giving the anticipated results. The Directors expressed their pleasure in stating that the difficulties arising from the pollution of the river and private fisheries had been settled. In moving the adoption of the report, the Chairman (Mr. T. Marshall) referred to the satisfactory completion of the new works and to the improved condition of the plant generally under the supervision of the new Manager and Secretary, Mr. J. F. Wicks.

Gas Workers' Wages at Leeds.—In pursuance of a resolution passed at a mass meeting of gas-workers in Leeds last Sunday week, the Secretary for the district (Mr. J. E. Smith) has sent the following letter to the Corporation Gas Committee: "I am instructed by my Executive Council to ask your Committee for the following alterations in wages and conditions desired by your workpeople: 4d. per day advance for stokers, firemen, purifiers, coal-wheelers, yardmen, and cinder-throwers; an eight-hour day for pipe-layers and men engaged in the meter department. I wish to point out to your Committee that certain sections of men working under the above heads have not received any advance for over twenty years—for instance, the stokers. It may be urged that if the stokers have not received an advance, they have secured a reduction in hours. But they have to work at far greater pressure now than when they were working a twelve-hour day. We are extremely desirous of settling this matter amicably if possible; and we respectfully ask you to call a special meeting of your Committee to consider this application. We are prepared to meet you, accompanied by a deputation of the men, to discuss the above points, if your Committee are desirous of having any further information in connection with this matter. I may add, in conclusion, that your Committee have many times expressed their desire to pay as much wages as other places doing similar work; and if you take comparisons, I think you will agree we are asking nothing unreasonable."

CORRESPONDENCE.

[*We are not responsible for the opinions expressed by correspondents.*]

"Induced Current" Incandescent Burners.

SIR,—Referring to the paragraph in your issue for Sept. 20 (p. 635), on the subject of "Patent Rights in 'Induced Current' Incandescent Burners," I should like to say that the patent of Mr. Willis for the use of gas *under pressure* to produce an induced current or currents of air to mix with the gas in its passage to an incandescent platinum wire gauze mantle is a totally different thing from the special burners designed and more recently in use to improve the incandescent light obtained from the Welsbach mantle. No comparison, therefore, is possible between the rough work necessary to bring a platinum basket to a state of incandescence (which requires very high pressures and large quantities of gas) and the scientific utilization of the ordinary pressures with much less gas and a more delicate mantle. Indeed, neither special injectors nor mixing cones are needed with the gas under high pressure such as would be given by the gasholders used by Mr. Willis; and the jets of gas under pressure issuing from his nozzles do not induce a flow of air in the same way as is done in either Bandsept's or Kern's burners.

Although Mr. Willis dealt with jets of gas (and sometimes air) under pressure, he did not think of an atomizer, as both Bandsept and Kern do. Now it is just this introduction of the atomizer, creating a certain resistance at the top of the burner, which necessitates an efficient injector; and Bandsept was the first to adopt this arrangement of the two together. The most perfect form of compound injectors and mixing cones would not do without a final atomizing of the gases; consequently, burners without atomizers cannot be compared with the Bandsept and Kern burner, any more than those assisted by exterior motive power can be compared with burners which only use the ordinary town pressures.

C. E. MASTERMAN.

Denayrouze Light Syndicate, Limited,
28, Victoria Street, Westminster, S.W., Sept. 26, 1898.

LEGAL INTELLIGENCE.

Liability for Damage to a Gas-Main.

At the Totnes County Court, on Tuesday last, the Totnes and Bridgetown Gas Company brought an action against Messrs. Hancock and Co., proprietors of "merry-go-rounds," to recover damages for the breakage of a gas-main. A traction-engine belonging to the defendants was hauling trucks along one of the roads of Totnes on the 29th of August, when the weight fractured one of the mains. It was stated that the loss of gas was 10,000 cubic feet, the value of which, with the cost of renewing the main, was placed at £2 19s. 10d. His Honour Judge Woodfall gave judgment for the Company for the amount claimed.

Littleborough District Council and the Gas-Works.—The Littleborough District Council have decided to ask the Directors of the Gas Company to state the terms on which they are prepared to sell their undertaking. The acquisition of the works is not a new proposal at Littleborough; and many have advocated it for a long time. It is thought probable that the Council would not have taken this step just now had they not wished to put themselves in a better position for opposing any extension scheme which might aim at adding Littleborough to Rochdale. The concern is a profitable one; the shareholders having received 10 per cent. dividends for many years.

Brynmawr Water Supply.—The water supply of Brynmawr has been a vexed question for a long period; and time after time attempts have been made to improve matters, but with little success. A disastrous fire in the latter part of last year, however, stirred the District Council into activity; and application has now been made to the Local Government Board for sanction to borrow £5000 for improving the water-works—including an increase in the storage capacity of the reservoir of 22 million gallons, which will give 40 gallons per head per day to 6000 people for 91 days. It is also proposed to build an additional filter-bed and to substitute 9-inch main-pipes for the existing 5-inch ones.

Abingdon Gas Company.—At the recent half-yearly meeting of this Company, a dividend at the rate of 4 per cent. on the "A" shares, and £2 16s. per cent. on the "B" shares was declared, and £14 was carried forward. The dividend compares unfavourably with the distribution at the same time last year, when it was at the rate of 5 and 3½ per cent., and a balance of more than £300 was carried forward. The Directors in their report stated that they were unable to recommend a larger dividend, owing to their late Manager having over-estimated the stock of coal and stores, &c., in hand during his management, in consequence of which it had been necessary for the purpose of the present balance-sheet to write off a considerable sum in respect of these two items.

Effect of the Use of Gas-Stoves on the Character of Dustbin Refuse.—Mr. Charles H. Lowe, the Surveyor to the Vestry of Hampstead, in reporting on the work done by his department during the past year, says: "The character of the contents of the domestic dustbin is undergoing a change, attributable to a large extent to the general adoption of the gas-stove. In the summer months, the bin receives every description of refuse except ashes—paper, cardboard boxes, tins, and vegetable cuttings being most in evidence. In the days of the kitchener, a large proportion of this was burnt. With the gas-stove, it cannot be so dealt with; and it is no uncommon experience, particularly in a high-class district, for the men to load up without having a particle of dust in their cart. This means, of course, an increase in that which is useless, and a decrease in that which has a money value." As the Vestry of Hampstead removed upwards of 27,320 tons of refuse during the year, this statement of the Surveyor is a striking testimony to the increased popularity of gas-stoves; and that such testimony should emanate from a district where electric lighting is now making such strides, must be encouraging to the Gas Company's shareholders.

MISCELLANEOUS NEWS.

MORLEY GAS-WORKS TRANSFER ARBITRATION.

Monday, Sept. 26.

(*Before Mr.* JAMES MANSERGH, *M.Inst.C.E., Umpire.*)

This was an arbitration to fix the price to be paid by the Corporation of Morley (Yorks.) for the undertaking of the Morley Gas Company, under an Act obtained last session. Mr. CORBET WOODALL was Arbitrator for the Corporation; Mr. THOMAS NEWBIGGING, for the Company.

Mr. BALFOUR BROWNE, Q.C., and Mr. FRANK BALFOUR BROWNE appeared for the Corporation; Mr. PEMBER, Q.C., and Mr. CLAUDE BAGGALLAY, Q.C., represented the Company.

Mr. PEMBER, opening the case, said this was a compulsory purchase. In the present year the Company went to Parliament for further powers; but the Corporation, having decided that they could with advantage purchase the undertaking, successfully promoted a Bill to give them the power to do so. The Company were in so prosperous a condition that the payment of maximum dividends was practically certain. The sound position was shown by the fact that such dividends had been declared for a considerable time; that the surplus of income over the amount required for this purpose was ample; that the business was increasing; and that the price charged for gas was low. The works, too, were in excellent condition. The only points to be considered really were the amount of the maintainable income, and then what number of years' purchase should be paid for it. In connection with the latter point, the question of stability of income was involved; but there was also another matter which had become in recent times of increasing importance—viz., that the value of money had been falling, and probably would continue to decrease. Having regard to these facts, the witnesses would contend that the income should be capitalized on the 3¼ per cent. table, or at 30·77 years' purchase. The stability of the income was indicated by the fact that in the last ten years the business had grown at the rate of 5 per cent. per annum; and the increase would doubtless have been greater if the Company had introduced prepayment meters and let out fittings on hire. The works were substantially built and in good repair; and the site was ample for the construction of additional appliances to meet any moderate increase that might be expected. The greatest day's make of gas was 517,000 cubic feet; yet the retort-house was capable of producing nearly 700,000 cubic feet, the purifiers could deal with 640,000 cubic feet, and the gasholder capacity was 900,000 cubic feet, which at a very moderate expenditure could be increased to 1,180,000 cubic feet. Roughly, the works could supply 25 per cent. more gas than the present requirement. The total share capital was £46,100. The first Act obtained was that of 1848, authorizing £5000 to be raised in shares at 10 per cent., with borrowing powers of £2500. The latter sum was subsequently converted, under the Companies Clauses Act of 1845, and became share capital. A second Act, obtained in 1868, gave the Company power to raise £3600 of stock at 5 per cent., and £35,000 at 7 per cent.; and this money was duly obtained. A third Act, of 1889, conferred further money powers, which, however, had not been exercised; and also authority to create a reserve fund of £5000. The total dividend payable on the existing share capital was £3380. There was a mortgage of £2800, £1800 of which was in connection with the original capital; the remaining £1000 referring to the £35,000 raised under the Act of 1868. The Company were entitled to convert the first-named sum into 10 per cent. shares, and the second into 7 per cent. shares; and, for the purposes of the accounts, the Company would ask the Umpire to assume that what they had power to do in this respect they had done. This conversion would mean that the amount the Company would have been entitled to divide would have been increased by £166. There was also a temporary loan of £1800 which they could pay off and re-issue, under the Act of 1868, as share capital at 7 per cent. In the same way this would have made a difference of £126 to the divisible income. Further, the Company, instead of investing the reserve fund, had spent it on the works. This sum, they said, should be considered as replaced, and, together with certain floating balances, supposed to be issued as share capital under the Act of 1868, it would make a further difference of some £406. These amounts of £3380, £166, £126, and £406 made a total of £4078 as the sum divisible among the shareholders. This figure capitalized at 3¼ per cent., gave £125,480 which, *plus* 10 per cent., or £12,548, the allowance for compulsory purchase, made £138,028. But the Company were not entitled to take away with them the temporary loan of £1800, and the £5800 of reserve fund and floating balances, because, as they had paid their maximum dividend for some years, the Corporation would be entitled to the reserve fund; and inasmuch as the Corporation would have to pay off the temporary loan, they should be allowed this also. Subtracting this £7600—£5800 and £1800—left £130,428. Then it was matter of agreement that the Company were to be allowed the expense of re-investment.

The UMPIRE: In addition to the 10 per cent.?

Mr. PEMBER: Yes.

Mr. BALFOUR BROWNE: We say not in addition, but in substitution.

Mr. PEMBER (continuing) said this cost was put at 2½ per cent., or £3260, which brought the total up to £133,688, the final figure of the valuation. Further dealing with the 2½ per cent., Counsel said that early in the parliamentary proceedings the Corporation agreed that the provisions of the Lands Clauses Act should be inserted; then subsequently came the decision of the Committee, saying that besides what was given under the Act the Company should have the cost of re-investment.

Mr. *Samuel Wood*, of the firm of Messrs. Alfred Lass, Wood, and Co., presented a series of tables relating to the position of the Company, which he had compiled from the books and accounts.

In cross-examination by Mr. BALFOUR BROWNE, witness said that at the present time the Company had only to pay dividends on £46,100, which required £3380. As to converting certain loans into share capital, this would be useless unless they had revenue to pay interest or dividend on it when converted. On Dec. 31 last, the Company had overdrawn their capital account by £4955. Witness had taken the accounts to the close of 1897, because the Company's year ended on the 31st of December. The £4955 was in the works. If this sum were reserve fund, it ought to

have been separately invested, in which case it would have had to be replaced by borrowed money, and interest paid upon it. The item for repairs of works and mains and services came out at 2·13d. per 1000 cubic feet of gas sold, which was very small. Asked by Counsel if he would be wrong in saying that, instead of 2·13d., 5d. was nearer the ordinary amount, witness replied that he would prefer not to answer the question. The total income in 1896 was £10,611, and £10,304 in 1897—a decrease of £307. Figures were put to witness showing that as between the receipts for the half years from 1895 to 1897 there was some considerable falling off.

By Mr. CORBET WOODALL: The insurance fund had been abolished; but this amount could not be carried to the reserve fund because it would have made it too great. It had been carried to the profit and loss account.

Mr. BALFOUR BROWNE: What did you do with it when you got it there?

Witness: We could not do anything.

Therefore this fund, instead of being applied to the reduction of the price of gas, still remains in the hands of the Company, and stands there undivided and illegal?—Yes; it is invested in the works.

In re-examination by Mr. PEMBER, witness said the accounts showed a surplus of £1209 above what was wanted for the payment of the maximum dividend in 1897, an excess of £887 in 1896, and of £607 in 1895—showing that the surplus had been growing.

Mr. PEMBER: If the conversion were made, these figures for interest on debenture stock and loans would disappear. In lieu of them dividends would be paid on the shares, and the surpluses would be proportionately increased?

Witness: Yes.

The stability is further increased by the fact that the charges for income-tax are included in the dividend. If these have been improperly paid, it is obvious that there is a slight further surplus?—That is so. The Company have paid full dividends, free of tax.

Mr. *E. Hardwick*, of Leeds, said he had been a Director of the Company for 46 years, and Chairman for 17 years. The Company had been successful for a long time; but at the commencement it was not well managed. The population of Morley consisted largely of working men employed in mills; and though some might take the electric light from the Corporation, they were not likely to do so generally. Certain of the mills had adopted electricity; but they still took gas for generating purposes. In several cases, owners of mills who had taken electricity talked of returning to gas on account of the excessive cost. The main street of Morley was already electrically lighted. The gas consumption had recently decreased, owing to a decline in trade. If electricity were generally adopted for public lighting, it would not mean a serious loss. If the Company had continued trading, they would have made a reduction in the charge for gas as from July.

Cross-examined by Mr. BALFOUR BROWNE: Generally the town was dependent on the cloth, coal, and stone trades. The supply of gas to mills was very remunerative, because they were sometimes going all night. In certain cases the supply of gas to mills which used it for generating electricity was more expensive than gas at the previous cost. It was not true that the collieries in Morley were becoming exhausted, as fresh beds of coal were being opened up. The district was of a mining character, which led to subsidences, with consequent drawing of pipe-joints and rather large leakage of gas. He could not say how many of the 3684 meters which the Company possessed had been stamped after inspection by the inspector appointed under the Act of 1869.

Re-examined by Mr. PEMBER: Some of the mills which supplied their own electric light were the best consumers the Company had. He did not regard the depression at Morley as permanent, because deeper beds of coal were being opened out.

Mr. PEMBER: Do you regard the desire of the Corporation to purchase your works as a symptom that they think the town is going down hill?

Witness: No; I do not think so.

Mr. *H. J. Hemingway*, Secretary to the Company, said the price of gas had steadily decreased from 1880 to the present time—falling from 3s. 4d. to 2s. 4d. per 1000 cubic feet; and if the Company had gone on they would have been able to make a further reduction. The 2s. 4d. was alike in excess of what was received owing to allowances that were made. With one trifling exception, he had never had a complaint from the Corporation. The illuminating power of the gas had been 17 candles for years past. The stock of the Company, which was held by 127 shareholders, was not quoted; and there were very few transfers.

Mr. *E. H. Stevenson*, examined by Mr. BAGGALLAY, said he had gone into the history of the Company for the last twenty years, as far as he could, and found that the business had been very steadily growing. Taken over this period, the increase had been more than 6 per cent. compound ratio, which was far above the average. Even in the last ten years it had been upwards of 5 per cent. The use of prepayment meters and the hiring of fittings would have considerably accelerated the increase. In another case, where these meters had been pushed, an advance of 10 per cent. in one year had resulted. The use of these meters would cause a new body of consumers, who would not pay half yearly, to take gas. Even if the Company had collected their accounts quarterly and not half yearly, he believed the consumers would have been more numerous. Moreover, by prepayment meters, capital was very advantageously employed; and with a low price of gas, as in the present case, the gain would have been higher than usual. The works of the Company were very substantially built—practically the whole of them having been erected since 1875. The only portions that were old were a holder and tank. The works were in first-class condition, and in excess of present requirements. There were only one or two small things which he should recommend to be done. The boiler was a new one, but it ought to be duplicated, and a new engine ought to be provided; but the cost of the two would only be about £400. The scrubbers were more than able to deal with the present make of gas. There were two exhausters—one with a capacity of 30,000, the other of 15,000 cubic feet per hour. The present retorts, allowing 10 per cent. as a margin, would easily make 792,000 cubic feet of gas per day, or 53 per cent. in excess of the maximum daily make hitherto. With very slight alteration, they could easily be made equal to the production of 922,000 cubic feet. The condensers were sufficient, but not much in excess of requirements. The tar and liquor storage was very large—equal to something like 130 days' maximum make. The purifiers, which were very spacious, were five in number, and equal to a daily make of 640,000 cubic feet. The oxide purifiers were changed about twice a week in mid-winter; and the lime purifiers about once a month. The works were well equipped in every way. The small works had an area of 1½ acres; and there was a further 6¼ acres, with an intermediate space which could be used for storage, but not for manufacture. This area was very conveniently situated for gas-works purposes.

Mr. BAGGALLAY: There is no further expenditure needed on works to supply a very much larger consumption of gas than at present?

Witness: No; I think an engine and a boiler, and an increase in the condensers, would easily furnish another 25 per cent.

And with small further expenditure you could supply a very long way ahead?—For an expenditure of £7000 or £8000, you could make a million cubic feet of gas a day.

Examination continued: The undertaking was in as good a position as one could be. It was almost unique, having regard to its margin in price. In his valuation, he had considered that the reserve fund was not invested. If it had been, there would have been a further income of £127. Then the Company had always paid the income-tax, which should have been deducted from the interest. This gave £152 which ought to be added to the surplus profits. He commenced his valuation with the figure of £3380, the dividend payable on the existing share capital. To this he added £166 in respect of the conversion into share capital of the £2800, bearing 3 per cent., £1800 at 10 per cent., and £1000 at 7 per cent. Treating the temporary loan of £1800 in the same way gave a sum of £126. Then there was the further sum which he held they ought to have raised, and which, in fact, somebody must raise, to reinstate the reserve fund, which would give a further £406 of additional income. Adding these four figures together produced £4078—a sum which would have been the annual income if the concern had remained in the hands of the Company. The additional interest they would have had to pay was amply covered by the surplus profits.

Mr. BAGGALLAY: Is the income, in your opinion, amply secured?

Witness: I think it is absolutely secured—as amply secured as any trading company's income can be. The £4078 is the maximum profit they can make. I think it is absolutely maintainable; and it is the maintainable profit with which I deal in this case.

Examination continued: The multiplier was based on the 3¼ per cent. table, which gave 30·77 years. He took this figure because he considered any company working under a maximum price and a fixed rate of dividend had their income better secured than was the case with one working under a standard price and a sliding-scale. The slightest change in the latter case altered the income. A great variation in the price of gas in the former case might occur without any alteration of income; and therefore he thought the income in this case was worth certainly another ¼ per cent. beyond what was ordinarily allowed. Multiplying the £4078 by 30·77 gave £125,480, which, *plus* 10 per cent. allowance for compulsory sale, gave £138,028. From this, however, he deducted £7600 capital which was not raised, but for which credit had already been taken; leaving £130,428. To this sum he added £3260, being 2½ per cent. for the cost of re-investment, which brought out his final figure of £133,688. This 2½ per cent. beyond the 10 per cent. for compulsory sale he thought he was justified in adding under section 5 of the Act.

Tuesday, Sept. 27.

Mr. *Stevenson*, in further examination by Mr. BAGGALLAY, said the mains and pipes were all in very fair condition, considering that the district was undermined. The expenditure on repairs and maintenance in the last year was low; the year before, it was high. It varied from year to year. The surplus profit of the Company last year, over what was required to pay maximum dividends, would have been £1500 or £1600 if the Company had not paid income-tax, and if they had invested their reserve fund as they ought to have done. After allowing for the increased sum divisible among the shareholders after the conversion, there would still have been a large margin to provide for any increased annual expenditure on repairs. The introduction of the electric light was not at all likely to affect the prosperity of the Company. A number of people who had taken the electric light had gas-stoves and gas-fires; and even where electricity was used, it was only partially taken. It was not his general experience that the introduction of electricity materially affected gas sales. He believed there was only one undertaking that had been affected by it; and that was The Gaslight and Coke Company, who stood in a peculiar position, as they only supplied the cream of London. Many of the people in Morley who had electric light used gas to generate their electricity. If electricity affected the sale of gas, the price charged for gas was so low that a small addition—say, to 2s. 6d. per 1000 cubic feet—could be made without affecting the consumption in the slightest. With the exception of four companies, the Morley Gas Company supplied gas more cheaply than any other in Yorkshire. This cheapness was largely due to the exceedingly low capital of the Company in proportion to the make—£5 11s. per ton of coal carbonized. Having regard to the large working-class population, he not think there was an undue proportion of 2-inch mains. The fact that the meters were not stamped was of no importance to this arbitration. The great number of 2-light meters was consequent on the large proportion of small consumers; but these small consumers added to the stability of the Company. There were 3338 small consumers, out of 3684; leaving only about 350 medium and large consumers.

Cross-examined by Mr. BALFOUR BROWNE: The superficial area he should allow in any condenser per day per 1000 cubic feet of gas made depended on the type of condenser. With the pattern in use at Morley, he should allow probably 5 feet superficial area for the condenser and the foul main. He should allow 4 feet of cubical contents per 1000 cubic feet of gas per day for scrubbers. If washer-scrubbers were used, the cubical contents through which the gas would pass, half of which was water, would be about 0·4. The cubical contents of the scrubber was 3000 feet, or about 5·8 feet per 1000 cubic feet. The box area he should use for oxide and for lime entirely depended on the coal used; it would be about 0·4. Taking the area of the purifier, and dividing by 0·4 gave the amount of gas it would purify. At Morley, the area was nearly 0·5. The retorts were capable of making 7000 cubic feet of gas per mouthpiece; if they made less, it was because they had more retorts than they wanted.

The works, with the expenditure of £400, could be put in condition to earn more than the required revenue. The number of premises in Morley might be about 5000, of which about 1000 did not take gas. This, he considered, allowed a large margin for future increase. Supposing they all took gas by prepayment meters, and on the average at Manchester—viz., 8000 cubic feet per meter—this would add another 8 million cubic feet to the consumption. But this was not the limit of possible expansion, because he did not think the town was going to cease growing. In his valuation, he put the total expenditure on repairs and maintenance of works, mains, and meters at 3·21d. per 1000 cubic feet. A number of other cases were put to him in which he had allowed a much larger figure under this head; but he alleged that in each case, as at Chesterfield and Ystrad, the circumstances were special. The sum of £698 which he included in the divisible profits, depended on the principle of the conversion of loans into shares; and capitalized at 30·77 years' purchase, it accounted for over £21,000 of the claim. The amount of the reserve fund was £4609; the insurance and contingent fund, £1000; and the accumulated balances, £4178—a total of about £10,000.

Mr. Balfour Browne: Suppose the accumulation of these funds is illegal?

Witness: That I cannot suppose.

I assume that a properly conducted company would have required this money?—Yes; it is being used as working capital.

If you had not got the working capital from this source, you would have had to raise it?—Yes.

If you had raised it in the cheapest form, it would have cost you 3 per cent.?—Yes.

And this would have been a deduction from your net profits?—Yes; but I cannot admit that the carrying forward of a balance is illegal.

In further cross-examination, witness said the multiplier depended entirely on whether the income was maintainable or not. He agreed that in many previous cases he had not put it so high; but this was because the present Company's income was so well secured. The difference between a statutory and a non-statutory company he had usually put at about 1 per cent., or 5 years' purchase.

Counsel was proceeding to question witness respecting the 10 per cent. allowance when argument arose as to whether it was allowable or not. Mr. Pember read from the proceedings before the Parliamentary Committee, from which he contended it appeared that the Committee deliberately passed the Bill on the understanding that the Company should be allowed the full 10 per cent. Mr. Balfour Browne dissented; but the argument was not prolonged.

By Mr. Newbigging: The trunk mains, for a Company of this size, were very large.

Mr. *Rayner*, Stockbroker, of Leeds, expressed the opinion that 2½ per cent. was a reasonable sum to allow for the cost of re-investment and to recompense the shareholders for loss of income while the money was being paid and a new investment found.

Mr. *Kirkby*, another Leeds Stockbroker, thought 3 per cent. should be allowed.

Mr. *W. R. Chester* said the Morley works were admirably situated for the supply of gas, the obtaining of coal, and the disposing of residuals; being beside the railway, in a low part of the town, and adjoining a public road. The new portion of the site was well adapted for extension of the works; and the surplus land was sufficient for the next fifty years. The buildings were in excellent condition, substantially built of stone, and in good repair; and, in general, the same might be said of the apparatus. He agreed largely with Mr. Stevenson, but thought he had under-estimated the capacity of some of the apparatus. He agreed that if the system of prepayment meters were introduced there would be a considerable increase of consumption. The increase per prepayment meter ranged from 10,000 to 20,000 cubic feet per annum. It was over 10,000 cubic feet in Nottingham. The average net receipts amounted to 2s. 1¾d. per 1000 cubic feet, which was very low as compared with other similar neighbouring undertakings. The maximum price which the Morley Gas Company could charge was 4s. per 1000 cubic feet; and the present price, 2s. 2d. There was therefore a margin of 1s. 10d. per 1000 cubic feet to work on before there need be any reduction of dividend. As regarded stability and prosperity, the Company stood in quite an exceptional position owing to this margin. Concerning the electric light, he said the universal experience was that its introduction had not diminished the growth of the consumption of gas, but that it caused an increased demand. The increase of income from prepayment meters and the letting out of fittings was likely to be much in excess of any decrease due to electric light. The expenditure on wear and tear in the year 1897—3·21d. per 1000 cubic feet—was insufficient to adequately maintain the works in proper condition. He should say for works of this character the average figure should be 5d. per 1000 cubic feet, or 1¾d. more, which would mean a further expenditure of £647. In his valuation, he started with £3380 as the maximum dividends payable on the existing capital. He then supposed that the £4600 of loan capital at 3 per cent. had been converted into share capital; but he had treated it a little differently from Mr. Stevenson. He believed these loans were held by existing shareholders; and therefore he had simply taken the difference between the actual dividend paid on the amounts, and the dividend which would be payable after conversion. Treating the £4600, the £1800, and the £2800 in this way, gave a sum of £238 to add to the divisible income—making it £3618. The next item of £406 in connection with the reserve fund and floating balances, he arrived at in the same manner as Mr. Stevenson. This increased the £3618 to £4024. This he capitalized at the high figure of 30·77 years' purchase, because he knew of no case in which there was the same stability of income; and this gave £123,818, to which he added 10 per cent. for compulsory sale, making £136,200. He thought the Committee of the House of Lords fully intended the 10 per cent. to be given. He next deducted from the £136,200, £5800 in respect of capital authorized, though not actually raised, but for which credit had been taken earlier, leaving £130,400. To this sum he added 2½ per cent., or £3260, for re-investment, which he held to be fully authorized by the Act, thus bringing out £133,660 as the total value of the undertaking. He was satisfied the income of the Company was more than sufficient to meet the amount divisible—to provide for the conversions, to pay full dividends on the share capital thus produced, and to leave a surplus more than enough to cover the extra allowance for wear and tear he had mentioned. There was a surplus income beyond what was required to pay the maximum dividends of £1291, to which had to be added £138, which would be produced from the reserve fund if invested at 3 per cent., and £151 in respect of income-tax which the Company had erroneously paid—a total of £1580. Then, in respect of raising the wear and tear allowance to 5d. per 1000 cubic feet, they would have to deduct £647; and for the conversion scheme, £644—leaving £289. This, however, did not take any account of increase arising from prepayment meters or other growth of business.

Cross-examined by Mr. Balfour Browne: He assumed that £138 was what the reserve would have produced if invested in Consols. To get this, the reserve would have had to be withdrawn, and replaced by money bearing interest, which interest would have to be set against the £138. Similarly the two items of £644 and £647 would have caused the remainder of the surplus to disappear, leaving only as surplus the income-tax paid in error.

Mr. Balfour Browne: Have you ever in your life put on a higher multiplier than 30·77?

Witness: No; and I have never come across an undertaking where the income was so well secured. I do not think much is to be feared from the introduction of the electric light.

Re-examined by Mr. Pember: He had made a mistake as regarded the £138, when replying to Mr. Balfour Browne, because lower down in his valuation he had made a deduction in respect of the replacing of the reserve fund, so that the £138 should stand as a surplus. Even if the whole of the surplus were wiped out, it could be at once replaced by increasing the price of gas 1d. per 1000 cubic feet; and with so large a margin as 1s. 10d., this could very well be done. An increase of 1d. would yield £370.

By Mr. Corbet Woodall: He preferred supplying a number of small consumers to one large one, because the latter could squeeze the Company as to price or exact a heavy discount, whereas the small consumers could not. He thought he was quite justified in regarding the income-tax as a surplus, seeing that the Company had paid both the full dividend and the tax as well. It would not go in reduction of the price of gas till a certain point had been reached.

Mr. *Wood* was re-called for the purpose of explaining certain small adjustments which increased the apparent profit for the year 1897 from £4624 12s. 8d. to £4913 15s. 9d.

Cross-examined by Mr. Balfour Browne: One item of the difference was the income-tax which had been paid erroneously.

Mr. Balfour Browne: Suppose they are not entitled to pay the income-tax beyond the 10 per cent. of dividend, should not every farthing paid as income-tax over 10 per cent. be brought back into account and handed over to us when we purchase?

Witness: If they were only entitled to 10 per cent. on their share capital, then they have had a little more than 10 per cent. As a matter of debtor and creditor, it should be brought back. Altogether the accumulated income-tax might amount to £4000 or £5000.

Mr. *Robert Porter* gave evidence agreeing with that of Mr. Stevenson and Mr. Chester as to the situation and construction of the works, which were well maintained and in excellent condition throughout. In his valuation he started with £3380, the dividend payable on the existing share capital. To this sum he added £180 for the conversion of £1800 loan capital into 10 per cent. share capital; £196 for the conversion of the £2800 debenture stock; and £406 in respect of the replacement of the reserve fund and floating balances, at present invested in the works and stocks, and the issue as share capital of £5800 which the Company have power to raise at 7 per cent. These three sums made the total amount divisible £4162, which, capitalized at 3¼ per cent., gave £128,064, and *plus* 10 per cent. (£12,806) brought the total up to £140,870. Deducting £10,600, the amount of capital not raised, left £130,470; and adding 2½ per cent. for re-investment (£3261), gave the final figure of £133,731 as the net value of the undertaking. He considered the concern exceedingly well secured; and he thought that the Company would be well able to pay their maximum dividends in future.

This closed the case for the Company.

(To be continued.)

COMMERCIAL GAS COMPANY.

The Half-Yearly Report and Accounts.

The following is the report of the Directors of this Company for the half year ending June 30, which, with the accounts for this period, will be presented at the meeting of the proprietors on Thursday:—

The Directors submit the accounts for the half year ended June 30, 1898. The revenue account shows a net profit for the half year of £53,958 11s. 1d. Deducting therefrom £4768 13s. 7d. for interest on debenture stock and loan, there remains standing to the credit of the net revenue account a balance of £49,189 17s. 6d. available for dividend. The Directors recommend that dividends be declared at the rates of 13½ per cent. per annum upon the old stock of the Company, and of 10½ per cent. per annum upon the new stock, both less income-tax. The balance of the net revenue will be carried forward to the next half year. Resolutions will be submitted to the proprietors authorizing the raising of further capital, in conformity with the Company's Act of 1875, as and when the Directors may deem advisable.

The accounts accompanying the report consist of the usual statements. They show that stock to the amount of £750,750 has been raised out of the total of £830,000 authorized; and that £200,750 has been borrowed out of £300,000 sanctioned. The receipts on capital account amount to £951,500; and there is £24,229 of premium capital—together, £975,729; leaving a balance of £9764. The expenditure on capital account in the past six months (£24,938) comprised £16,791 for new and additional buildings, plant, &c.; £2116 for mains and services; £2075 for meters and stoves; and £3949 for "coin" meters and fittings, less £1319 written off for depreciation. The total expenditure to June last amounted to £1,010,471; showing that the capital account has been overdrawn to the extent of £34,742. The reserve fund at the above-named date stood at £42,093, and the insurance fund at £28,652. The

balance-sheet shows that the value of the stores in hand at the close of the half year was as follows: Coals and oil, £21,715; coke and breeze, £139; tar, ammoniacal liquor, and sulphate of ammonia, £4787; and sundries, £16,268—making a total of £42,909. The revenue and profit and loss accounts, together with the statements relating to the working, are given below.

REVENUE ACCOUNT.

To Manufacture of gas—				By Sale of gas—			
Coals and oil, including dues, carriage, unloading, and trimming	£70,588 2 6			Common gas, per meter, at 2s. 6d. per 1000 cubic feet	£141,484 10 1		
Salaries of Engineer and Officers at works	2,383 10 0			Public lighting and under contracts, common gas	10,131 10 11		
Wages (carbonizing)	18,800 9 2					£151,616 1 0	
Purification, including £2304 19s. 0d. for labour	4,707 14 8			Rental—			
Repair and maintenance of works and plant, materials and labour (less £363 15s. 10d. received for old materials)	16,945 19 1			Meters	£2,358 16 1		
		£112,955 15 0		Stoves	1,273 13 2		
Distribution of gas—				Coin meters and fittings	2,124 10 2		
Salaries and wages of Officers (including Rental Clerks)	£1,696 13 9					5,756 19 5	
Repair, maintenance, and renewal of mains and service-pipes, including labour	2,498 17 10			Residual products—			
Repair and renewal of meters	1,772 0 4			Coke, less £4132 15s. 9d. for labour	£21,182 8 6		
" " stoves	1,456 9 2			Breeze, less £811 13s. 8d. for do.	397 15 4		
" coin meters and fittings	1,319 13 7			Tar	6,435 11 8		
		8,743 17 8		Ammoniacal liquor and sulphate of ammonia	6,027 10 9		
Public lamps—Lighting and repairing		3,154 7 9				34,043 6 3	
Rents, rates, and taxes		6,798 4 2		Miscellaneous receipts—			
Management—				Rents receivable	£301 19 4		
Directors' allowance	£1,250 0 0			Transfer fees	30 0 0		
Company's Auditors	75 0 0					331 19 4	
Salaries of Secretary, Accountant, and Clerks	1,129 10 10						
Collectors' salaries and commission	1,584 5 7						
Coin meter collection	276 14 1						
Stationery and printing	598 13 5						
General charges	425 16 4						
		5,340 0 3					
Bad debts		548 3 10					
Law charges		97 13 2					
Superannuation		126 0 0					
Official Officers		125 13 1					
		£137,789 14 11					
Balance carried to net revenue account		53,958 11 1					
		£191,748 6 0				£191,748 6 0	

PROFIT AND LOSS (NET REVENUE) ACCOUNT.

Interest on debenture stock	£4,516 17 6	Balance, Dec. 31, 1897	£45,288 12 0
Interest and dividend balance	251 16 1	Amount brought from reserve fund	2,174 15 2
Balance available for dividend, carried to balance sheet	49,189 17 6		£47,463 7 2
		Less dividend paid for half year ending Dec. 31, 1897, £47,461 7s. 2d., and forfeiture for defective power, £2	47,463 7 2
		Balance from revenue account	£53,958 11 1
	£53,958 11 1		£53,958 11 1

STATEMENT OF GAS MADE, SOLD, ETC.

Quantity Made. Meter Register.	Quantity Sold. Public Lights and under Contracts (estimated).	Quantity Sold. Private Lights (per Meter).	Total Quantity accounted for.	Number of Public Lights.
Thousands.	Thousands.	Thousands.	Thousands.	
1,292,324	63,406	1,132,754	1,214,261	5,065

STATEMENT OF COALS.

Description of Coal.	In Store, Dec. 31, 1897.	Received during the Half Year.	Carbonized during the Half Year.	Used and Sold during the Half Year.	In Store, June 30, 1898.
	Tons. Cwt.	Tons. Cwt.	Tons. Cwt.	Tons. Cwt.	Tons. Cwt.
Common	15,792 0	102,466 6	100,140 16	391 10	17,726 0
Cannel	8,826 0	—	72 0*	—	8,754 0
	24,618 0	102,466 6	100,202 16	391 10	26,480 0

* 934,849 gallons of petroleum spirit used as a substitute for cannel.

STATEMENT OF RESIDUAL PRODUCTS.

	In Store, Dec. 31, 1897.	Made during the Half Year.	Used during the Half Year.	Sold during the Half Year.	In Store, June 30, 1898.
Coke—tons	7,417	61,330	18,105	50,502	140
Breeze—chaldrons	2,400	10,658	—	12,628	430
Tar—gallons	366,490	1,180,302	—	1,251,192	295,600
Ammon. liq.—butts of 108 gals.	13,931	33,248	42 105	—	5,074
Sulphate of ammonia—tons	222½	1,269	—	1,286½	205

BRITISH GASLIGHT COMPANY, LIMITED.

The Half-Yearly General Meeting of this Company was held on Wednesday last, at the London Offices, No. 11, George Yard, Lombard Street, E.C.—Mr. J. HORSLEY PALMER in the chair.

The SECRETARY (Mr. H. B. Chamberlain) read the notice convening the meeting, as well as the report of the Directors and the accounts for the six months ending June 30. The report stated that the balance of profit was £21,026, after deducting the following items, and adding £75 from the Trowbridge reserve fund; the parliamentary interest at that station not having been realized by this amount. The deductions were: Income-tax, £816; Hull excess profit, £793; Potteries excess profit, £1337; Norwich debenture interest, £918; Potteries debenture interest, £386—total £4251. The gas-rental at Hull showed an increase of £2143, as compared with that of the corresponding period of 1897—the price of gas having been the same at each period. Coke and tar were about the same. Tar distilling and ammoniacal liquor exhibited a decrease of £528; and sulphate of ammonia an increase of £631. Coal had cost 10s. 6d. per ton, as against 9s. 11d. before. Coke had realized the same price—viz., 8s. 1d. per ton. The quantity of gas sent out was 423,303,604 cubic feet, as against 406,031,610 cubic feet—an increase of 17,271,994 cubic feet (4·25 per cent.). The profit realized was £793 in excess of the parliamentary interest allowed. This sum had been invested in Consols; making the reserve fund at this station £34,382. The gas-rental at the Norwich station showed a decrease of £2862 as compared with that of the corresponding period of 1897, owing to the reduction in the price of gas from 3s. 6d. to 3s. per 1000 cubic feet from Jan. 1. The sum realized for coke, tar, and ammoniacal liquor showed a decrease of £693; the quantities made being much less in consequence of the introduction of carburetted water gas. Coal had cost 14s. 3d. per ton, as compared with 15s. 11d. Coke had realized 7s. 7d. per chaldron, as against 6s. 1d. The gas sent out was 149,709,000 cubic feet, as against 149,855,000 cubic feet, or a decrease of 146,000 cubic feet (0·09 per cent.). The profit realized was £4288 less than the parliamentary interest. The decrease in the consumption of gas having been arrested, the Directors trusted that the former prosperity of the station would be resumed at no distant period. The gas-rental at the Potteries station showed an increase of £459; the price of gas having been the same as at the corresponding period of 1897—viz., 2s. 3d. per 1000 cubic feet. The sum realized for coke, tar, and ammoniacal liquor showed a decrease of £305; and sulphate of ammonia, an increase of £260. Coal had cost 8s. 4d. per ton, as against 8s. Coke had realized 4s. 6d. per ton, as compared with 4s. 9d. The gas sent out was 159,420,000 cubic feet, as against 151,046,000 cubic feet, or an increase of 8,374,000 cubic feet (5·54 per cent.). The profit realized was £1337 in excess of the parliamentary interest allowed; and this sum had been invested in Consols—making the reserve fund at this station £17,101. The gas-rental at the Trowbridge station showed an increase of £175; the price of gas having been the same at each period—3s. 2d. per 1000 cubic feet, with discounts. Coal had cost 13s. 8d. per ton, as against 13s. 3d. Coke had realized 5s. 10d. per chaldron, as against 6s. 10d. The quantity of gas sent out was 23,087,953 cubic feet, as against 22,147,100 cubic feet, or an increase of 940,853 cubic feet (4·24 per cent.). The profit realized was £75 less than the parliamentary interest; and this sum would be taken from the reserve fund—leaving a balance of £2943 to the credit of that account. The profit from the Holywell station was £336. Adding the total profit to the previous balance of profit and loss made £44,684, from which the Directors recommended a dividend at the rate of 10 per cent. per annum, clear of income-tax. This would amount to £21,000, and leave a balance of £23,684.

The CHAIRMAN said it was now his duty to move the adoption of the report and accounts; and, in doing so, he would make a few remarks on the business of the half year, which he trusted might be of interest to the shareholders. He would first take their most important station—Hull. It would be remembered that at the last meeting he informed the shareholders that the Directors were entering into an agreement with the Corporation for lighting the district of Kingston-upon-Hull, which had been taken over from a local Company. He need hardly say that, in making an agreement covering so large a business, there had been many difficulties—though not of a very important nature—which they had had to discuss with the authorities. But he was glad to be able to inform the shareholders that these difficulties had been overcome. He did not think the agreement had yet been absolutely signed and sealed; but it was practically settled between them, and showed exactly what the Company had to do, and what the Corporation had to pay. The latter were still in negotiation with the North-Eastern Railway Company, with regard to the construction for a big subway underneath the dock, which subway was to carry the gas-mains into the Kingston-upon-Hull district. Therefore the Directors did not anticipate having to light the district before next spring—he thought it would probably be about May or June. This was of some advantage to the Company, because

it would enable the Directors and Engineers to go very carefully into the matter, to learn what extensions, if any, would be required in connection with the manufacturing plant and gasholders, and various other details. He was glad to say the Board found the Corporation, the Engineers, and the staff generally at Hull very friendly towards them; and everything had been settled in a most amicable manner. The business at Hull during the last six months had progressed very favourably. With coin meters alone they had had an increase of 437; and the total number now fixed there was 4221. They had also had an increase of above 200 in the number of stoves on hire; and the total now stood at 2573. The new retort-house (No. 4) which was built about a year ago had been fitted entirely upon the regenerative systems of Hislop and Winstanley—principally by the system of the latter; and they were working in a most satisfactory manner. The result was a very large saving in the wages bill. The Directors had now before them the question of reconstructing, in the immediate future, No. 1 retort-house, which was the oldest on the works. Their Engineer was at present engaged upon the plans; but the Directors had not so far decided as to whether they would again adopt regenerative furnaces or put in inclined retorts. He now came to the next station—Norwich—which he might say at once was responsible for the "knocking off" of the bonus which the shareholders had been enjoying for so many years. They would remember that he informed them at the last meeting that the Directors had decided upon a very drastic alteration in the price of gas at Norwich. Their business had been very much cut into by the electric light; and there appeared to be a reluctance among the people to take their gas on account of the high charge. But the Company were burdened there with a system of discounts, which, in his (the Chairman's) opinion, interfered with the consumption of gas. People only looked at the price of 3s. 6d., and never considered the matter of discounts. The Directors accordingly reduced the charge for gas at one step from 3s. 6d. to 3s. per 1000 cubic feet, and did away with the discounts. This, of course, was, as he had said, a drastic measure; and the Company were suffering from it at the present time. They felt, however, it was the only course to pursue. The Norwich accounts were made rather worse this half year by the inclusion in them of the sum of £733 for discounts. Under the old system of book-keeping, the discounts were not taken off the amount of the gas bills at the end of the half year, but were brought into the half-year's accounts when they were absolutely collected and allowed to the consumers. The consequence was that, though they were crediting themselves this half year with gas at 3s. per 1000 cubic feet, they were debiting themselves with discounts really appertaining to the previous six months. If they had debited the half year with its own discounts, the accounts would have contained the discounts for an entire year. Therefore the present accounts were £733 worse off than they really ought to be. Another item had been exercising the minds of the Directors—that was the enormous burden of rating. They had, however, determined to appeal against it. The amount they had had to pay in the half year for rating was £1132; and in addition to this the authorities had increased the rates from 8s. 4d. to 8s. 8d. in the pound. This burden had become so intolerable that the Directors had determined to apply for a large reduction of their assessment. His colleague, Mr. Corbet Woodall, had thrown himself heartily into the matter, and had advised the Board so clearly on the point, that they had gone before the Assessment Committee and demanded a heavy reduction; and if they won their case, as they had every prospect of doing, the Company would save a large amount on that account alone. These were two items in which the Norwich accounts could be improved; and, besides, he was glad to say that he believed the decrease in the consumption of gas at Norwich had been arrested. They had placed at the Norwich works a very energetic and capable Engineer from the Potteries station (Mr. John Young); and he certainly had been doing all he could to promote the Company's interests there, and with a certain amount of success. They had had a considerable increase in the consumption of gas during the last two or three months; and they must give Mr. Young time. One could not expect him to grip fresh business all at once. He (the Chairman) had sincere hopes that they had turned the corner at Norwich; and he really did believe they would soon show a better state of affairs there. At the Potteries, the business was still progressing favourably, both with regard to the profit earned and the consumption of gas. They had for some time been very much hampered there for office accommodation. It had been insufficient, not only for the clerical work, but also with respect to show-rooms. An opportunity had, however, occurred of securing, for a very moderate figure, excellent premises—a corner site, almost in the centre of Hanley. They had purchased the place at a cost of £4500; but this did not appear in the present accounts, because they did not pay the money in the past half year. He was told by people connected with Hanley that they had made a very good purchase indeed, which they would never have to regret. With regard to the other two small stations—Trowbridge and Holywell—everything had gone on satisfactorily. The Engineer at Trowbridge (Mr. H. Sainsbury) had had a serious illness, which he (the Chairman) was sorry to say had laid him up for some time; and he sincerely hoped he would soon recover. He did not think there was anything to say with regard to the general policy of the Company. The Directors had exercised themselves in the consideration of the Workmen's Compensation Act; but, like many other Companies, they were at present holding their hands with regard to the matter. The Insurance Companies were asking very high rates of premium. The Directors considered, looking at the small amount of the liability they had incurred during a great many years, and the extraordinary liberality with which they had treated their workmen when accidents had overtaken them, that they were entitled to ask the shareholders to allow them to be their own insurers in this respect, and, even if they did not absolutely set aside a certain amount of money, to permit them to continue in the same way as they had hitherto done, and deal with the cases as they arose in the ordinary way. It would be remembered that at the last meeting he particularly pointed out to the shareholders that they would probably have to drop the bonus on this occasion. They had done so simply because they had not earned it; and the reason they had not earned it was the transition state of affairs at Norwich. He hoped that at some future date they would be able to resume the bonus, the discontinuance of which affected Directors and shareholders alike—indeed, the Directors were very considerable shareholders. It would be the earnest endeavour of the Board to lay before the proprietors a more favourable statement with regard to the Norwich station next half year.

Mr. Frederic Lane Linging seconded the motion, which was unanimously carried.

On the motion of the Chairman, seconded by Colonel J. Wilkinson, a dividend at the rate of 10 per cent. per annum was declared.

On the proposition of the Chairman, seconded by Mr. J. B. Coulson, Mr. Corbet Woodall was re-elected to his seat on the Board.

Mr. Woodall, having responded, moved the re-election of Mr. Linging; remarking that it had been a great satisfaction to have him bringing his long accumulation of knowledge of the Company back to its service; and they all heartily hoped he might long stay with them in the capacity of a Director.

Mr. R. Stevens seconded the motion, which was agreed to.

The retiring Auditor (Mr. E. Yardley) was also re-appointed, on the proposition of Mr. Stevens, seconded by Mr. R. S. Gardiner.

Mr. Leonard Wilkinson moved a hearty vote of thanks to the Chairman and Directors. He referred to the confidence the shareholders had in the Board, and said that if any of them came to the meeting with doubts as to their affairs at Norwich, these doubts had been set at rest by the eloquent speech of the Chairman.

Mr. Coulson seconded the motion; and it was carried unanimously.

The Chairman having briefly responded,

A similar compliment was paid to the Secretary and officers of the Company; and an acknowledgment by Mr. Chamberlain concluded the proceedings.

ALLIANCE AND DUBLIN CONSUMERS' GAS COMPANY.

Appointment of Mr. W. F. Cotton as Managing-Director.

The Half-Yearly General Meeting of this Company was held last Friday, at the Offices, D'Olier Street, Dublin—Mr. C. Lawler, J.P., in the chair.

The Secretary and Manager (Mr. W. F. Cotton, J.P.), having read the notice convening the meeting, the report and accounts, dealt with in the "Journal" last week, were presented.

The Chairman, in moving the adoption of the report, remarked that there had been only a slight augmentation in the quantity of gas sold, which was accounted for by the past unprecedentedly mild winter. The increase, which was about 9 million cubic feet, might be attributed to the use of additional cooking appliances and penny-in-the-slot meters. The Directors were glad to be able to say that the general public of Dublin were at last beginning to use gas-cookers and prepayment meters. What surprised him was that while in London and all the cities and towns in England gas cookers and heaters were largely used for cooking, the employment of them in Dublin was comparatively small. If the householders knew the advantages to be derived from using them, they would soon give up that worst and most expensive form of cooking apparatus—the close range. The Board had every year, for some time, engaged qualified professors of cookery to give lectures on cooking by gas. The charge for these lectures was only a nominal one; and no lady should neglect attending them. At the present time there were upwards of 800 cookers and 2000 prepayment meters in use—in fact, they were scarcely able to complete the orders. During the past half year, the market for residuals had remained depressed; and prices were gradually getting worse, with the exception of sulphate of ammonia, which had slightly improved. To give the proprietors an idea of the serious depression, he might state that for the year ending June, 1895, coke produced £30,176, as compared with £27,415 last year, although they sold a much larger quantity. Tar in 1895 brought in £8693; last year, only £5150. Sulphate of ammonia produced £9307 in 1895; last year, £6627. This made a total decrease of about £9000. These reductions had seriously affected the income of the Company. They were all well aware that coals had made considerable advance in price. After waiting some time in the hope that prices would fall, the Directors were obliged to make contracts at about 1s. per ton in advance of former rates. Having regard to these circumstances they were considering the advisability of making a slight increase in the charge for gas. However, as the market price for residuals had taken an upward turn, they had decided to postpone the question until the end of the Christmas quarter, in the hope that the market would continue to improve. The Directors had to record the lamented death of their colleague, Mr. E. Fottrell, who had been a member of the Board for thirty years, for twenty-five of which he filled the position of Chairman. He had a kindly manner, and was courteous to all; and his death was regretted by every official of the Company. By his removal, each member of the Board felt that he had lost an old and a valued friend. Referring to the proposed retirement of Mr. Cotton from the position of Secretary and Manager, the Chairman said: I shall have the pleasure of proposing to you a resolution in reference to our Secretary and Manager, Mr. W. F. Cotton; and in order that you may understand his position, I will go back to the beginning of his connection with the Company. In 1873 the Company was in a very bad way—I might say on the verge of bankruptcy. The shareholders were two years without dividends; and the consumers were dissatisfied, not alone with the price of gas, but also with its quality and the scarcity of the supply. The shares were selling at £8 10s.; and £10,000 of the revenue had been spent for capital purposes. A Committee of Shareholders, including myself, waited on Mr. Cotton, and begged of him to take up the position of Secretary and Manager, which, after some time, he consented to do. At that time he had been ten years an official of the Corporation of Dublin, every member of which held him in the highest esteem. The early part of his life he spent with the Hibernian Company, which then lighted the city. What was the position of the Company when he joined? There were no funds available for any purpose. Look at our position to-day. Including reserve, contingent, and insurance funds, we have a sum of £57,000. At the time of his appointment, the consumers were charged 5s. 6d. per 1000 cubic feet for gas; to-day the price is 3s. 5d. The second half year after he took office, the shareholders received a dividend of 6 per cent.; the third, 7 per cent.; the fourth, 8½ per cent., besides paying back to the capital account the £10,000 overdrawn. The next year we reached a 10 per cent. dividend, and subsequently 10½ per cent. Every shareholder will be pleased to

hear that Mr. Cotton is not going to sever his connection with the Company. On the contrary, he has given the Board an undertaking that he will continue the management, so that the shareholders may have the benefit of his services. The Directors abstained from filling up the vacancy on the Board in order to co-opt Mr. Cotton, who will act in the capacity of Managing-Director. From the number of proxies received, it is quite clear the shareholders as a body are in favour of the Directors' proposition.

Mr. JOHN R. WIGHAM, J.P., seconded the motion; and it was carried unanimously.

Dividends for the half year at the rates of 10½ and 7½ per cent. per annum having been declared,

The CHAIRMAN said the next resolution was that to which he had already referred; and the terms of it were as follows: "That, in consideration of the valuable services rendered to the Company by Mr. W. Francis Cotton during his connection of twenty-five years with the Company as Secretary and Manager, he be granted, on his retirement from his position of Secretary and Manager, a retiring pension of £1500 per annum, to continue during his life, and to be payable to him quarterly from the date of his retirement, out of the revenue of the Company; and that an agreement by, and under seal of, the Company be entered into with him for the purpose of carrying this resolution into effect."

Mr. J. E. FOTTRELL said he had great pleasure in seconding the resolution. He said he had the good fortune to be in the confidence of his father, the late Chairman, and could say he was in touch with Mr. Cotton from the day that gentleman entered the services of the Company; and he felt certain that, had his father been spared, nothing would have given him greater pleasure than to propose the resolution which the Chairman had placed before them. Besides that, he himself had opportunities of knowing the business capability of Mr. Cotton—in fact, this was known to them all. Of course, it would be a loss to the shareholders that he should now retire from the position of Secretary and Manager; but he (Mr. Fottrell) felt certain this loss would be more than compensated for by the assistance he could give the Board as Managing Director. He had perfect confidence in recommending the adoption of the resolution.

Mr. G. CREE, as a shareholder of the Company from the time of its formation, said he should like to bear testimony to the fact that, after passing through many vicissitudes, the fortunes of the Company began to revive from the day Mr. Cotton became an officer. As one of the Auditors, he had had some experience of the inner working of the Company; and he felt bound to say its success was mainly due to the great talents, business capacity, and immense energy of the Secretary and Manager. In the absence of his colleague, he desired to express the great pleasure he felt in adding this tribute of respect and approval on the part of the shareholders to the election of Mr. Cotton as Managing-Director of the Company.

The CHAIRMAN, in putting the resolution, said that, with regard to the observations which had fallen from Mr. Fottrell and Mr. Cree as to the loss of Mr. Cotton's services, it should be remembered he would now be Managing Director—that he would practically continue the same work of supervision as in the past, for he was one of those who could not give up labour. He thought on this question he ought to read a letter which had been received by the Directors from Mr. Cotton. It was as follows: "I have to thank you for the generous manner in which you have dealt with the question of my approaching retirement from the office of Secretary and Manager of the Company, and for the proposals you are placing before the shareholders as to my pension for the future. I can only say, if the Directors, on my retirement from my present position, will do me the honour of co-opting me to the vacant seat on the Board, I shall, so long as health permits, and the Board wish to avail themselves of my services, without fee or reward, as Managing Director, devote myself, to the best of my ability, to the interests of the Company."

The motion was then put, and cordially adopted.

Mr. COTTON, who was received with applause, said: Mr. Chairman and gentlemen, need I say that I feel deeply indebted to you for your kind consideration of my past services, and to you, Mr. Chairman, in particular, for the impressive way in which you stated my case. I may assure the shareholders that it was never intended by me to sever my connection with the Company so long as my services are appreciated by a Board of Directors with whom it has been the pleasure of my life to work for your benefit. No words of mine could convey to you the kind consideration I have experienced from them, especially during the troublous times, of which we have had many; and you may attribute a great deal of the success of the Company to the good feeling which has existed between the Board and its officers.

The CHAIRMAN said he had now to move that Mr. Francis T. Cotton be appointed Secretary of the Company. Mr. Cotton had filled the office of Assistant-Secretary since the death of his late lamented brother, and he was a gentleman fully qualified to fill the position. He was an engineer, with a knowledge of gas making, and also of electricity; so that he was most suitable for the appointment. He (the Chairman) did not think any better selection could be made; and he had great pleasure in moving the adoption of the resolution.

Mr. J. M'BRIDE, J.P., seconded the motion, which was unanimously carried.

Mr. W. ANDERSON proposed a vote of thanks to the Chairman and Directors for the manner in which they had conducted the business of the Company in the past year. He desired to join in the expression of regret by the Board regarding the death of Mr. Fottrell, and said he was glad to see that Mr. Lawler had been elected to succeed him. With regard to Mr. Cotton, his election as a member of the Board was the reward of merit; and he would say, from a close, intimate knowledge of Mr. Cotton, that no reward was ever more deserved than his.

Mr. SPRING seconded the motion.

Mr. BROOKS, in putting the resolution, said he could not lose this opportunity of expressing his personal regret for the loss the Board had sustained by the removal of Mr. Fottrell. With regard to Mr. Cotton, he should be neglecting his duty if he did not express his personal feeling that he was thoroughly and absolutely the man to fill the office which he was now by their approval called upon to fill. As to their new Chairman, he was glad to offer his testimony to the excellent qualities possessed by Mr. Lawler.

The motion was carried unanimously.

The CHAIRMAN briefly returned thanks, and the proceedings closed.

LEICESTER CORPORATION GAS AND ELECTRICITY ACCOUNTS.

At the Meeting of the Leicester Town Council last Tuesday, the Gas and Electric Lighting Committee reported that the accounts of the gas undertaking for the half year ending June 30 last had been submitted to them, from which it appeared that the net profit, after paying interest on the capital of the undertaking, was £11,653. Out of this had been paid £409, being the half-year's amount of the sinking fund; leaving a balance of £7559 to be applied at the end of the financial year (the 31st of March next) as the Council might direct. The Committee also reported that the accounts of the Electric Lighting Department had been submitted, from which it would be seen that the result of the working of this department for the above-named period was a net profit, after charging £581 17s. 4d. to the sinking fund account, of £46 3s. 4d. The total amount which had been paid on account of the sinking fund was £4207.

Alderman LENNARD, in moving the adoption of the first portion of the report, said there had been expended, out of the amount borrowed, up to the end of June last £844,602. There was an increase in revenue of £3515. The total expenditure on revenue account was £72,047, against £67,320 in the corresponding period of 1897—an increase of £4727. It showed a bad start towards making a profit when the increased receipts were less than the increased expenditure by a little over £1200. Last year they paid 6d. per ton more for their coal; and this year there had also been an advance of 6d. The extra expenditure was for coal, repairs and maintenance, and stoves. The other items on the expenditure side remained about stationary, with the exception of there being a decrease of £256 in the expenditure on purification. The additional receipts from gas engines and stoves represented just 10 per cent. of the increase. Considering that they had raised the number of engines from 661 to 680, and of stoves from 9401 to 10,789, this seemed surprising. It was due to the phenomenal weather this year. The Committee calculated that the increased consumption, if the weather had been normal, would have made their profits £1500 more. They had received 50 per cent. of the cost of the coal back again in residuals. One of their difficulties had been the advance in the price of their raw material. The tar products also formed a serious difficulty; and with some of the principal products down to half price, and no signs of an early recovery, it was not an easy matter to forecast what the results with respect to this matter would be. One of the most serious obstacles to making profit last year had been that they had been increasing their works and spending a large amount of money on extensions which, up to the present, had been unproductive, and which he hoped this year they would be able to use and make reproductive. He estimated that they had £120,000 of capital laid out which had not yet brought them in a penny. Some of these works had existed six or seven years. They had to provide for maintenance, although the part of the work in question had not brought them in a single penny. Their works, however, were now absolutely complete; and it was his intention to ask the Council early in December to make a general inspection of them, and see how things were carried on. He believed that they had come to the end of the chapter in the matter of extensions and expensive maintenance, and to the bottom of the depression in their profits; and he thought that from now their profits would considerably increase, especially if favoured with a cold winter or two, when they would see them go up by leaps and bounds. The number of men employed in the department during the last half year had ranged from a maximum of 1300 down to a minimum of 1000. Comparing their gas-works with others, and taking all circumstances into consideration, he was quite sure they had done as well as they had ever done before.

Mr. ROWLETT seconded the motion.

Mr. CLARKE asked whether there was any intention of reducing the price of gas to users of slot meters; also whether the Committee intended to lower the charges made for the electric current.

Alderman VINCENT said the pleasantest portion of the Chairman's remarks was where he said that the profits of the gas-works were likely in future to continuously and rapidly increase. He (Alderman Vincent) regretted that during the past few years they were a gradually decreasing quantity. In the past half year, they had sold the largest quantity of gas, and made the best price for residuals; but the profits had gone down 20 per cent. With regard to the charges for repairs and maintenance, he quite believed in keeping the plant in excellent order, and making every requisite provision for depreciation; but when they were paying more than £8000 a year into a sinking fund which would purchase the whole fee simple of the undertaking in an allotted time, they would acknowledge that some consideration was due to the present ratepayers, and that such charges should not be placed to revenue, but should fairly be charged to capital. They were face to face with very large necessary expenditure for various public works to which the Corporation were committed. They were undoubtedly under the necessity of providing an additional water supply for the borough; and altogether their rates were likely to keep up. He was glad, therefore, to hear that the profits from the gas undertaking were likely to increase, and he hoped it would be so.

Alderman LENNARD, in reply, said a gas undertaking could not be provided in penny numbers—they had to establish complete and efficient plant to begin with; and altogether a sum of £16,000 a year might be put down as necessarily unproductive. About £3000 of this was caused by the abolition of meter-rents three years ago; and £2500 had been paid yearly for interest, for which there was no return. Their coal account had also gone up. In reply to Mr. Clarke, it was true they charged to users of slot meters a rate which worked out to 2s. 9d. per 1000 cubic feet, which was slightly in excess of that charged to other consumers; but they did not get anything like the same profit out of them that they did out of the others. They had to provide a special meter and a staff of collectors, so that the extra expense more than swallowed up the difference. He knew how easy it was to get up an election cry; but he could assure the Council that the Committee were as anxious as anybody to reduce the price of gas, if they could see their way to do so.

The report was adopted.

Alderman LENNARD next moved the adoption of the second part of the report. [In the course of Alderman Lennard's speech, the electric light in the Council Chamber suddenly went out.]

Mr. BOOTH thought it was too bad that the electric light in the Council Chamber should go out while the alderman was speaking.

Alderman LENNARD said he believed this was the first time such a thing had occurred under the circumstances. It was caused by a fuse having gone wrong in the immediate neighbourhood, and had nothing to do with the machinery at all. Every year since they had had the electric light their business in this direction had been increasing 50 per cent. Other towns in competition with each other had shown big profits, but piled up their capital account to double that of Leicester. In reply to Mr. Clarke, he might remark that it was easy to make reductions in the price if they were prepared to forego a profit. There was, however, one thing he would say on behalf of the Committee, and that was that a considerable reduction could be made in the price if consumers would take electricity in the daytime. He might say that the day price could be reduced nearly one-half, and still leave a profit. But with regard to night consumption, he could not promise a reduction from 5d. per unit till Alderman Vincent, their Chancellor of the Exchequer, would tell them he did not want any more money.

The report was adopted.

ELECTRIC LIGHTING NOTES.

At a meeting of the Lighting Committee of the Cardiff Town Council last Tuesday, a letter was read from the Local Government Board sanctioning a loan of £28,125 for electric lighting purposes—to be repayable in 25 years.

The Hampstead Vestry prides itself on the progress of its electric lighting undertaking. It is surprising, therefore, that the following paragraph in the annual report of the Surveyor (Mr. Charles H. Lowe) was not deleted before its publication: "The street-lamps maintained, cleansed, and lighted by the Gas Company number 2326—an increase on the year of 86. In addition, there are eight lamps in Finchley Road which are not used, but which are maintained in readiness in case at any time the electric light should temporarily fail."

The Electric Lighting Committee of the Wimbledon District Council appear to be very pleased with the progress their electric lighting undertaking is making; and they have, with every confidence, asked and obtained the consent of the Council to an expenditure of £3000 on additional cables. Mr. Crimp, the Chairman of the Committee, states that, in response to a circular sent out, demand for current has arisen nearly all over the parish, and from every class of ratepayer. But it is a strange thing that from the centre of the town, where the Committee expected to get a very large demand indeed, they have had no application. In the meantime the applications represent 6678 8-candle power lamps, including street-lamps.

Several references have been made in these "Notes" to the electric lighting undertaking of the Torquay Corporation. It appears that there is at present considerable uneasiness in the town concerning the borough finances—the new rate recently made being the highest on record. A comparison has been made between the expenditure of the old Local Board and that of the Corporation; and it shows that public lighting under the former cost £1850 a year, whereas under the Council the average cost has gone up (by £425 per annum) to £2275, exclusive of the increased cost for the electric light. During the six years the town has been incorporated, the debt has been increased by £100,000. For the electric lighting, drainage, and destructor loans, the ratepayers are taxed to the tune of £2000 a year.

The Electric Lighting and Tramways Committees of the Huddersfield Corporation have been considering the question of applying electric traction to a section of the tramway system. The Borough Electrical Engineer estimates that the cost of the additional buildings and plant which will be required by the Electric Lighting Committee will be £31,500 (including £599 for contingencies). He places the total charge payable by the Tramways Committee at 3·30d. per unit, of which the generation of the electricity will require 1d., interest and sinking fund 1·63d., and repairs 0·67d. Therefore, the Electric Lighting Committee will not profit by the arrangement. To carry out the scheme, the Corporation have given their consent to the Committee applying for the sanction of the Local Government Board to the borrowing of £50,000.

The Penzance Town Council are perturbed by a threatened invasion of the electric light. Edmundson's Electricity Corporation regard the town as a likely place for exploitation, and are threatening to apply for a Provisional Order. They have offered to insert clauses giving the Corporation the option of purchasing the undertaking at the end of 7, 14, or 21 years, upon an independent valuation as a going concern. But the Corporation would rather have nothing to do with it. They had managed, as the Chairman of the Lighting Committee naively confessed, to shelve it for eight years, and they would like to put it off a little longer. The Mayor (Mr. W. H. Julyan) expressed the opinion that Penzance was not ready for the adoption of the electric light, and that the light might be much improved. Yet they must either engage in a scheme for which they were not ripe, or hand over another monopoly which they would have to make sacrifices to buy out. This was a position in which Parliament ought not to have placed them. However, he would rather spend the money than be a party to putting power in the hands of another lighting monopoly. It was resolved to dissent from the Edmundson Company's application.

Many complaints have been made of the unsatisfactory result of the electric light in the streets of Exeter. The cause was explained in a report laid before the City Council last Wednesday. In the first place, it seems, the Jandus lamps failed because they were not properly constructed to work on the higher-pressure circuits. In consequence of this, the whole of them had to be removed from the streets, and old lamps in stock temporarily fitted to supply their place. Then the Davy alternating arc lamps gave trouble through the mechanism jamming. However, everything is to be right in future. The contractors for the Jandus lamps have refitted them, and they are refixed; while the Davy Company have undertaken to supply new lamps. Fortunately for the ratepayers, all this is to be done at the expense of the contractors. A report was also presented to the Council respecting the combined action of the electric lighting authorities threatened with proceedings for infringement of the Rucker transformer patents. Down to the middle of August, the combination included electric companies with a gross revenue amounting to upwards of £400,000, and municipal authorities with electric light works of which the revenue is upwards of £68,000. Under these circumstances, the Town Clerk of Exeter was able to report that the Corporation's liability would be only about 10s. per cent. of the costs incurred; and formal sanction was given to the proposal that the Council should join the combination, and contribute to the defence fund.

A meeting of ratepayers, convened by the Chairman of the Weston-super-Mare Urban District Council (Mr. B. Heap), was recently held in the Town Hall for the purpose of considering the electric light question, which is now before the Council with the view of a scheme being carried out. Mr. H. Butt was the first speaker. He said he was as much opposed as ever to the project, which some time ago was spoken of as a matter of about £20,000; whereas to carry it out would mean an expenditure of something nearer £50,000 or £60,000. He thought it was far better that a scheme of this magnitude should be carried out by a private company than by a body of councillors who had their own businesses to attend to besides the affairs of the town. It appeared to him that the terms offered were fair, inasmuch as the Council were safeguarded in being able to buy the scheme when it paid. It was surely better to buy a paying concern, and pay a little more for it when it was a success, than to start a thing under risky conditions. He thought the number of lamps put down as likely to be taken by the ratepayers was a farce. In a limited area, it was impossible to get a large number of lights; and if they did not have these, how could they get their return? He was not against the electric light; but he was against the Council committing themselves to an expenditure of not less than £50,000 when they had other things that required to be done more urgently. He moved—"That, in the opinion of this meeting, it is not desirable that the Urban District Council should carry out the Provisional Order for lighting the town with electricity, but that the best possible terms should be made with a reliable company for carrying out the work, and for the resumption of the same by the town at the expiration of a reasonable term." Mr. Norman seconded the motion. He argued that the Council would be embarking upon a very risky speculation if they undertook the scheme, which, he said, was doomed to failure if they touched it. Mr. Ball pointed out that the Council were in possession of a Provisional Order which they were asking to be allowed to carry into effect; and while they were in this position they could not, in his opinion, deal with a company. He admitted, however, that if they left the scheme alone they would have freer hands to take up other matters. Mr. Harvey contended that there were other schemes of far greater importance for the welfare of the town than the electric light. Eventually, the motion was carried; and it was also resolved to form a Committee to oppose the application by the Council to the Local Government Board for money to carry out an electric lighting scheme.

The Price of Gas at Leeds.—In accordance with the resolution come to at the recent meeting of the Leeds Corporation Gas Committee (*ante*, p. 649), at the next meeting of the Leeds City Council Mr. Joseph Lowden, as Chairman of the Gas Committee, will move that the resolution passed by the Council on the 9th of October, 1895, as to the price of gas be rescinded, and that the Council reduce the price of gas to consumers within the city of Leeds from 2s. 2d. to 2s. per 1000 cubic feet, and to consumers outside the city from 3s. to 2s. 10d. per 1000 cubic feet, such reduction to take effect in respect of gas consumed on and after the 1st of January next.

Torrington Water Supply.—An unexpected check has been given to the scheme for the improvement of the water supply of Torrington. Serious complaint has been made for several years of the inadequacy of the supply; and the Great Torrington Water Company at length offered to sell their undertaking to the Corporation, and leave them to provide capital to develop the works. The Corporation and the ratepayers agreed to the proposal; and Mr. Baldwin Latham prepared a scheme for enlarging the reservoir and other works. Application was made to the Local Government Board for a loan of £11,000; and the hope was expressed that, as the town is small and its resources limited, the period of repayment would be extended to the utmost. The Local Government Board have, however, informed the Corporation that, owing to the age of the water-mains and the condition of the reservoir, only ten years will be allowed for repayment of the loan for the purchase of the works. They also require the Corporation to obtain control of the catchment area, both as to the right to the water and as to restriction of manuring operations on any arable land comprised within it; while they ask to be furnished with a report by a qualified chemist as to the quality of the water. The Town Council have sent a copy of the Local Government Board's letter to Mr. Latham for his opinion, and have at the same time instructed him to discontinue preparing plans for the extension of the reservoir.

The Proposed Purchase of the Skipton Gas-Works by the District Council.—A largely-attended meeting of ratepayers was held in the Town Hall, Skipton, on Monday last week, for the purpose of taking into consideration the proposed purchase of the gas-works by the Urban District Council. The matter has been under discussion by the Local Authority for several months; and they decided to offer the Gas Company £30,000 for their works. This offer the Company refused. The Council had engaged Mr. Waugh, of Bradford, to advise them upon the condition of the plant; and his report has been open for the ratepayers' inspection during the past few weeks. Mr. J. B. Dewhurst, the Chairman of the Council, presided, and he was supported by all the members who were not directly interested in the Company. The Chairman proposed a resolution to the effect that the ratepayers and owners should give their consent to an application by the Council for compulsory powers of purchase. Mr. Throup seconded the resolution. Mr. J. Roberts said he thought the proposal was forty years behind the time, seeing that the electric light was coming so much to the front. Mr. Chadwick pointed out that Skipton could obtain plant and mains for electric light for £10,100, and they would probably have to pay £60,000 for the gas-works. Mr. Robinson, the Vice-Chairman of the Council, said the Council were not so foolish as to pay £60,000 for the gas-works. Mr. Chadwick replied that if they did not do so they would not get them. Mr. C. Smith said, in answer to a question, that if the Council were called upon to pay £55,000 for the works, they would be able to make a profit on the present price of gas—2s. 11d. per 1000 cubic feet. After some further discussion, the Chairman called for a show of hands, and declared the resolution carried. A poll was demanded.

EAST LONDON WATER-WORKS COMPANY.

Half-Yearly Report and Accounts.

In the report which the Directors of the above-named Company will present to the proprietors next Thursday, only brief reference is made to the troubles which have recently come upon them. They explain that the very severe drought, continuing throughout a lengthened period, diminished the flow of the River Lea—the Company's main source of supply—to an extent hitherto unknown, so that "for safety's sake" the Directors were obliged to husband the supply in the reservoirs by reverting, on the 22nd of August, to the intermittent system. They say that, by purchasing all available water from other Companies, and by every means in their power, they did their best to "remedy and mitigate any inconvenience and discomfort caused to the consumers by the shortened hours of supply." A large expenditure has been thereby incurred; so that it has been found necessary to decrease the dividend and increase the reserve fund. The new services laid on in the six months ending June 24 numbered 3074, against 2968 last year; the total number now in supply being 194,600. The reports of Sir Edward Frankland, the Government Analyst, as well as those of Sir William Crookes and Professor Dewar, continue to show that the water supplied is efficiently filtered, and of a high standard of purity. All the works have been maintained (under the supervision of Mr. W. B. Bryan, the Engineer) in an efficient condition.

The accounts accompanying the report show that the revenue from all sources in the six months covered was £168,010, against £158,035 in the corresponding period of last year—an increase of £9975. The expenditure on maintenance was £60,074; on management, £13,502—together, £73,576. For the first half of last year, the figures were £54,464 and £12,784—together, £67,248—showing an increase of £6328 for the past six months. The Directors say the balance in favour of revenue over expenditure may be regarded as fairly satisfactory. The amount available for distribution is £87,220; and a dividend of 3½ per cent. for the half year (less income-tax) will be recommended. This will absorb £60,220, and leave an unappropriated balance of £27,000.

SERIOUS POSITION OF THE BIRMINGHAM WATER SUPPLY.

In the course of Mr. Chaplin's reply to the deputation which waited upon him on the 24th ult. to express indignation at the curtailment of the water supply at the East-end, and to call upon the Government to hold an autumn session in order to place the supply under public ownership and control, he pointed out, in regard to this proposal, that the change of ownership would be no guarantee against the evils of which complaint had been made, for in some parts of the country, even where the supplies were in the hands of the Local Authorities, troubles equal to, or even worse than, those at the East-end were being experienced. The President of the Local Government Board instanced Birmingham as a case in point; and the seriousness of the position of affairs in the capital of the Midlands was shown by the few lines given in the "Journal" last week (p. 706). The officials of the Water Department have issued appeals to the public to curtail their consumption as much as possible, and the use of water for public purposes is being kept to the lowest possible level. But it is stated that the appeals "fall on deaf ears." The immediate danger is not so great; but an early winter with severe frost would bring about the most serious consequences. With the view of letting the public know the exact condition of the water resources of the city, a number of representatives of the Press were invited last Wednesday to inspect the Corporation's reservoirs at Shustoke and Whitacre; and the following is a brief account of what they found: The Shustoke reservoir covers an area of 90 acres, and has a storage capacity of 400 million gallons. All around the sloping sides there was a bank of concrete, whitened by the deposit of lime left by the receding water. The water was 8 ft. 6 in. below its proper level; and it sinks about a couple of inches every day. It is stated that this reservoir has never been so low as it is at the present time since it was opened in 1882. Considerably more than half its available capacity has been emptied to meet the excessive demand of the past hot and dry summer. The reservoir is supplied by the River Bourne, which is now little more than a trickling ditch. At Whitacre, the other storage reservoir, capable of holding about 20 million gallons, is absolutely empty. At the present time Birmingham is consuming in its dwelling-houses and factories, and in various other ways, no less than 19½ million gallons of water per day. The present population in Birmingham is 715,000, and last year the water consumption averaged 23·7 gallons per head. The consumption is now at the rate of 27 gallons per head per day—an excess of 1½ gallons per day over last year's summer figures, and of nearly 4 gallons over last year's average. It will be four years before the water from Wales is available; and unless the present supply is increased, the consequences during those years may be very serious indeed. If the city has to depend on the quantity of water now stored, it will only have sufficient for ten days. It appears that 6½ million gallons of water are being drawn daily from the deep wells; but as these have been recently pumped to the full extent of the water they will render, they will shortly have to be left at rest.

In Birmingham, as in the East-end of London, there is great waste of water. In the former city, the Water Department have inspectors all over the town examining fittings and doing all that is humanly possible to prevent waste through mechanical defects. In this they are fairly successful. But, as pointed out by a writer in the "Birmingham Gazette," it is the waste through carelessness and extravagance that it is so difficult to guard against. People will complain that their neighbours waste water; but when it comes to a question of prosecution they back out of giving evidence. He says very pertinently: "It is for the public to learn that, unless they protect themselves, they expose themselves to the most serious consequences. What is wanted is that people should recognize their responsibility, and that they should beget a conscience in this matter. Every gallon of water wasted is a wrong done to the community at large—a direct menace to the health of every man, woman, and child. Yet rich and poor, with reckless prodigality, draw on the supply as though the water were already pouring over the aqueduct from Wales, and the supply practically unlimited. . . . If the public are wise, if they are good citizens, they will exercise the strictest supervision in the use of water. The danger is present and immediate. Private consumers alone are to blame; with private consumers lies the remedy." This advice is equally applicable in London.

THE PROPOSED ACQUISITION OF THE DORKING WATER-WORKS BY THE LOCAL AUTHORITY.

The Transfer Sanctioned by the Company.

An Extraordinary General Meeting of the Dorking Water Company was held last Wednesday, for the purpose of considering a special resolution authorizing the sale of the Company's undertaking to the Dorking Urban District Council, upon the same terms as if the Council had obtained powers for its compulsory purchase. The proceedings were regarded as private; but the Secretary (Mr. T. A. Sommers Scott) furnished to representatives of the Press a *résumé* of what had taken place. The resolution to sanction the purchase had to be passed by a majority of three-fourths of the shareholders present, either personally or by proxy, both as regards the number of votes and the value of shares held. As the total represented was 245, the requisite majority was 184. The votes recorded were: For the resolution, 186; against, 59. As regards the worth of the votes recorded, the total value was £12,880, the requisite majority of which was £9660. The value recorded for the resolution was £9790 (being £130 in excess of the minimum); against it, £3090. The number of shareholders who voted personally was 11, and by proxy 48, making a total of 59; the number of those in favour being 52, against, 7. The following resolution was therefore passed: "That this Company agrees with the Dorking Urban District Council (subject to the Council obtaining the approval of the Local Government Board), to sell and transfer its undertaking to the said Council, such transfer and the price to be paid to be made and determined in all respects as though an Act had been obtained for the compulsory transfer of the undertaking; and the Directors are hereby authorized to enter into such contract as may be necessary to give effect to this resolution."

THE PROPOSED PURCHASE OF THE DEVONPORT WATER-WORKS BY THE CORPORATION.

Compulsory Powers to be Applied For.

A Meeting of the ratepayers of Devonport was held on the 22nd ult., to consider the resolution adopted by the Town Council in favour of the compulsory purchase of the water-works. The Mayor (Mr. Waycott) presided over a large attendance. Feeling on the subject apparently ran high, and most of the speeches were accompanied by a running fire of comment.

The Mayor explained that three years ago, in consequence of the dissatisfaction existing in the borough, and more especially of an incident that occurred to one ratepayer, a meeting was called to consider the town's position in respect to the Water Company. The meeting decided that the time had come when the Town Council should take up the question of acquiring the rights of the Company, and appointed a Committee to deal with the matter. The Company had been asked whether they were prepared to sell their property to the Corporation; but they were not prepared to treat. The Council wished for an expression of opinion from the meeting as to the desirability of applying to Parliament for compulsory powers to acquire the property.

Mr. H. Whitfeld, the Chairman of the Water Committee of the Council, moved a resolution expressing approval of the decision of the Council. The fact that they had taken three years to consider the question was proof that they were not disposed to act in haste. When the Company was formed, it was on the distinct understanding that the charges for water in Devonport should not exceed those in Plymouth. But they had obtained from Parliament power to raise their charges in order to meet their increased liabilities for improvements, though they had shown, by the profits they had made, that there never was any necessity for so doing. In opening negotiations with the Company, they made an offer, in the form of annuities, which guaranteed the very highest rates of interest they could possibly earn under their Act. This offer represented the capitalized equivalent of £350,000 on a paid-up capital of £175,000. It was a generous and munificent offer; but it was refused. Did not common sense suggest that in this refusal the Company supplied them with a reason for going on with the proposal to purchase? In 1871, the population of Devonport was 49,000, the income of the Company was £5756, and the charge for water per head of the population was 2s. 4d.; whereas in 1896, the population was 57,000, the income of the Company was £13,304, and the charge per head was 4s. 8d. In 1876, the dividend of the Company was a fraction over 2 per cent., and there was no reserve; but in 1896, it was upwards of 4 per cent., and the reserve fund was £2962. This practically represented the doubling of the financial advantage of the Company; and they felt that this advantage was growing. If it was good for the Company, was it not good for the ratepayers? Mr. Diggle, the financial and engineering expert engaged by the Corporation, in his report said: "After having most carefully gone into the whole matter from a financial as well as an engineering point of view—for both must be considered in the question in conjunction with each other—I feel quite confident that the increased revenue of the undertaking will be more than sufficient to meet all additional charges for annuities, interest, &c., against revenue." In all large enterprises of this description, it had of late been the custom of Parliament to grant a period of seven or ten years during which the payment to the sinking fund should not be made. Mr. Diggle felt sure he could get seven years for Devonport. Assuming this to be done, there would be no charge whatever upon the rates for the first seven years, as the additional income would meet all additional charge against revenue. But even taking the most unfavourable aspect of the question, and assuming that Parliament did not grant this postponement of the sinking fund payments for seven years, which was

not at all likely, Mr. Diggle estimated that the annual charge could not exceed a rate of 4d.—possibly only of 3d.—in the pound annually. This would, he said, continue for a very limited number of years, and should really not be considered as a loss at all, for by a sinking fund the water-works would ultimately become free of charge in the same way that property did when the owner paid off a mortgage upon it at a certain fixed sum per annum.

Mr. T. Carrinford seconded the motion, and said that for twenty years there had been a feeling that the rights of the Water Company ought to be acquired by the town.

Mr. H. Banbury said they were all water buyers, but they could buy even gold too dearly. Mr. Whitfeld had quoted only a small portion of the report of Mr. Diggle. They were practically told to lay hold of the water rights, and never mind the cost. If the Company accepted the terms of the Corporation for annuities, every halfpenny of the capital would be carried forward for 60 years. At the end of this period, it would be redeemed at 33⅓ years' purchase, which would mean an outlay of £318,000. The Water Committee had not seriously considered the expenditure. The leat would have to be piped, and a storage reservoir built. The piping alone would extend 20 miles; and he estimated that it would cost £5000 a mile. This would mean a total of £100,000, while the construction of a storage reservoir would involve an outlay of £200,000; so that £300,000 must be laid out almost immediately after Parliament sanctioned the purchase. Some of the ablest financiers in the town estimated that the charge upon the rates would be 1s., or possibly 1s. 3d., in the pound. The ratepayers required more information. If they studied their own interests, they would not support the proposal of the Committee.

Mr. W. E. Harvey characterized the scheme as one of the maddest things he had ever heard of.

Dr. J. Rolston challenged Mr. Whitfeld to read the whole of Mr. Diggle's report. That gentleman told them that unless they made a liberal offer they had no chance of getting the Company's property. They had made a liberal offer, and it had been refused; and now if they went to Parliament they would incur a heavy expense which the ratepayers would have to pay. The water supply was good, pure, and well managed; and, under these circumstances, he was not prepared to advocate a cause which would entail a 6d. or 1s. rate for sixty years.

Mr. G. Rundle, referring to the financial portion of the question, said that when the Water Company went to Parliament twenty years ago their revenue was less than £1000 a year. During the past fifteen years, they had increased it from £3000 to £4000 a year. The whole liability of the Company on capital account amounted to only £180,000.

At this stage of the proceedings, the meeting was adjourned.

The adjourned meeting was held last Tuesday—the Mayor again presiding.

Mr. C. B. C. Thomas, who resumed the discussion, said the Water Company, which was formed in 1793, went to Parliament in 1876 for power to provide filter-beds and give a continual supply. The Town Council opposed the Bill, and endeavoured to get the works into their own hands, but they did not succeed. Since 1876 the Company had furnished a continuous supply and charged an increased rate. The Council had offered the Company far better terms than they would get by their earnings in the next forty or fifty years.

Mr. W. Ford, in supporting the resolution, said he was also in favour of the Corporation purchasing the gas-works, though he was a shareholder in the Gas Company. The profits of these undertakings should go into the pockets of the people who created them, rather than into those of alien and absent shareholders.

Mr. R. S. Smith contended that the Corporation were not justified in purchasing the water-works even at the price of £350,000 proposed by the Water Committee, though he believed the market value of the undertaking was nearer £500,000. The Company's receipts were £13,700 a year. Of this amount, more than £5000 went for wages, and the maintenance of plant; leaving £8000 to pay interest. How was it possible to pay off £350,000, out of a margin of £8000? If the Corporation purchased the water-works the result would be a loss to the town.

Mr. W. Osborne pointed out that three years ago Mr. Smith spoke in favour of the town acquiring the water-works; and all that had occurred in the interval strengthened the case for municipalization.

Mr. J. C. Tozer said they were all in favour of the principle that the Corporation should have control of the water supply, but they should have the details of the scheme before them to enable them to come to a right conclusion. If the works cost £350,000, and the piping of the leat and other improvements involved an outlay of £150,000, they had a total of £500,000. To borrow this at 2¾ per cent. would mean £13,750. The present net profit of the Company was £6000; but if they allowed for the probable increase, and put it at £7000, this would leave the ratepayers with a liability of £6750 a year, which was equal to a rate of 7d. or 8d. in the pound. In addition, the repayment of the capital would require a further rate of 3d. or 4d.; and they would thus have a total burden of a rate of 1s. in the pound for a period of sixty years.

Mr. T. Proctor argued that the experience of other county boroughs justified the Corporation of Devonport in proceeding with the scheme. As to the piping of the leat and other improvements, if the Corporation did not do the work the Company must; and in either case the cost would have to be borne by the people of Devonport.

Alderman E. Emdon said the exact amount of the capital of the Company was £189,866. The income for the past year was £13,871; maintenance expenses were £2778; management came to £2007; and rates and taxes to £902, making a total expenditure of £5687. It remained to be seen whether Parliament would give so long a period as sixty years for the repayment of the capital. In any event, a serious loss would result to the town from the purchase of the works.

The Mayor remarked that the question they should ask themselves was whether they could afford to pay a few pounds more on their rates, and whether they were justified in doing so. He did not wish to influence them either way, and should be prepared to stand by their decision, and do his best, whichever way the voting went.

Mr. Whitfeld, replying on the discussion, quoted a letter from Mr. Diggle, in which that gentleman said the statements made at the previous meeting were not calculated to further the economical purchase of the undertaking, and expressed the hope that opposition would cease to put a fictitious augmentation on the value of the Company's property. As to the statement that the piping of the leat and a storage reservoir would cost £300,000, Mr. Diggle said: "There is no reason that I know of why the cost should exceed one-third of that amount, sufficient to meet an increased population of at least 30,000, so far as the reservoir capacity is concerned. Interest and sinking fund upon £100,000 would only amount to £3500, while the additional water obtained for sale at the present prices charged by the Company would produce about £7000 per annum." If it was true that every £100 share in the Company was now worth £140, and that £500,000 would be required to acquire the undertaking, this was all the more reason they should seize the opportunity to stop that aggregation of profits for division among ten gentlemen—profits which the householders were really entitled to share. Parliament was continually granting a period of sixty years for the repayment of capital in such cases. They took £300,000 as the probable cost of the Devonport Water-Works. Interest and sinking fund spread over sixty years on this amount would involve an annual payment of £10,265, to which must be added £6500 working expenses; making a total of £16,765 per annum. Towards this sum they would receive in water-rates £14,063; leaving a deficiency of £2702, which on the basis of the rateable value of the year 1897 would involve a rate of 3½d. in the pound. If the sinking fund were suspended for seven years, as had been done in the case of every town that had similarly applied to Parliament in recent times, the annual charge for interest would be £8250, which, with the £6500 working expenses, would reach a total of £14,750. Subtracting from this the gross income from the water-rates, they had a deficit of only £687 per annum, or less than a rate of 1d. in the pound. During the seven years' suspension of the sinking fund, the increase in the rateable value and the water rates would be more than enough to meet the sinking fund and wipe out the penny rate. In 1880 the rateable value of Devonport was £148,645, and in 1898 it was £221,000; and they were now face to face with a great increase in the rateable value. The first use to which the revenue from such a source should be put ought to be the acquisition of the revenue-earning property.

The resolution was carried by a large majority. A poll was demanded; but the application was not persisted in after it had been pointed out that this was not a statutory meeting, and the gentlemen demanding it were asked to guarantee the cost if the poll should go against them.

THE DERWENT WATER SCHEMES.

A Special Meeting of the Sheffield City Council was held on the 28th ult., to consider the recommendation of the Water Committee, referred to last week (p. 707) that the Corporation should lay claim to the Derwent as a source of water supply, and promote a Bill or Bills in Parliament to substantiate their claim against that of the Derby Corporation or any other. The discussion of the question occupied more than two hours; and, in the result, a resolution was passed giving the necessary authority to the Committee to move in the matter, either alone or in conjunction with the Corporations of Nottingham, Rotherham, Doncaster, or Barnsley, or any of them, with the view of acquiring the water of the Rivers Derwent and Ashop, or a competent share thereof. Earlier in the week, the Leicester Corporation visited Ashopton, and drove up the Ashop and Derwent Valleys. The first pause was made about a mile above the village of Bamford, where it is proposed to construct a huge compensation reservoir to supply the mills from there down the valley to the Trent. This reservoir will be something like 3 miles long, and in parts will attain to a depth of 80 feet. There are only five mills for a distance of 20 miles down the valley; and of these only two are of any importance. The gathering-grounds proposed to be tapped possess two great negative advantages—there is no agriculture, and practically no population. The water will be impounded in reservoirs at an altitude of from 600 to 800 feet above sea-level, and consequently will flow by gravitation to Oadby. The site for the first reservoir was pointed out in a part of the valley which might have been formed by Nature for the purpose. It was stated that it would provide storage for more than 2000 million gallons of water, which would be impounded by means of a masonry dam, something like 120 feet in height. This reservoir would be about two miles long; tailing off just above where the River Allport falls into the Ashop. From this reservoir the water would be carried by the conduits to Leicester, or possibly in the first instance to a service reservoir nearer Derby—for the scheme will be so designed that at any time an amalgamation with the Derbyshire authorities can be arranged. Higher up the valley the visitors were shown the suggested site of the second or top reservoir—another natural basin. There will be two reservoirs up the Derwent Valley—in addition to the compensation reservoir at Bamford—and both will be of considerable capacity. A walk of a couple of miles, after the road had become too rough for driving, brought those of the party who undertook the journey to the site of the top reservoir, and within view of the head of the valley. It was stated that the gathering-grounds of the Derwent and the Ashop were of about equal extent, and would produce a similar quantity of water. The total yield has been variously estimated at from 50 to 55 million gallons per day; and of this 30 million gallons will be available for ordinary use, and the rest for compensation purposes. The entire scheme involves the construction of five large reservoirs, and possibly a service reservoir; but in the event of powers being secured by Leicester, a start would be made with the Upper Derwent portion of the scheme, leaving the Ashop Valley to be dealt with afterwards.

The Extension of the Bristol Water-Works.—The erection of the pumping station at Blagdon, Somerset, for the Bristol Water Company, is about to be commenced. This work is in connection with the operations, commenced in 1891, of impounding the waters of the Yeo and formation of a reservoir from which the water will be pumped to the present reservoir near Bristol. The new reservoir, when completed, will have a capacity of 2000 million gallons. The water will cover an area about 1¾ miles in length, and will be in some parts 40 feet deep. The pumping-station will consist of two large engine-houses with two engines in each, boiler-houses with six boilers, a large chimney tower, coal stores, workshops, &c.

THE CONGRESS OF THE SANITARY INSTITUTE.

The Annual Congress of the Sanitary Institute was opened in Birmingham last Tuesday, under the presidency of Sir J. Fayrer. There was a large attendance of members from all parts of the kingdom; and they received a public welcome at the Council House from the Lord Mayor (the Right Hon. C. G. Beale), who subsequently presided at a luncheon.

The opening meeting was held at the Birmingham and Midland Institute. In his Presidential Address, Sir J. Fayrer surveyed the progress of preventive medicine or hygiene during recent times. In bringing about this progress, the Sanitary Institute had, he said, taken an important part. He traced the history of that body from its establishment, and referred to the numerous other organizations which had been formed with a similar object in view. He described the conditions under which the people lived fifty years ago, and contrasted them with the present conditions. Public health, he remarked, was now cared for in a sense which was utterly unknown in the past. Houses were better built; sewerage, drainage, and ventilation were provided for; the land was better cultivated and the subsoil better drained; the absolute importance of pure drinking water was recognized; food was more varied and more nutritious in its character; and clothing was better adapted to climate. If all the existing official provisions were enforced, little would remain to be desired on the part of the Executive Government. But as some Acts were permissive, not compulsory, and as others were utterly neglected, much of the benefit they might confer was lost, though education had done much. Upwards of 200 millions sterling had been spent on sanitary work, with great benefit to the public health. Popular teaching and example, and the general diffusion of education, were still necessary in order to convince the proletariat of what so intimately concerned their vital interests. The death-rate was susceptible of further diminution, and expectancy of life might be enhanced; while the general conditions of living and exemption from certain forms of disease were by no means so perfect as they might be. Tainted water was still drunk; chimneys still vomited forth their smoke and chemical fumes; and rivers were still polluted. Cesspools and imperfect drains, badly-constructed, ill-ventilated houses, and so on, still defied alike sanitary law and common sense, and it would perhaps not be until the more complete organization of the public health administration under a Minister of Public Health was effected that the full benefits of sanitary legislation would be realized, and the people attain to that standard of health and duration of life for which they had a right to hope. A vote of thanks was accorded to the President for his address.

The sittings of the various sections were well attended; and a large number of papers were read. Only a few of them, however, had any special interest for our readers. Alderman Cook, Chairman of the Health Committee of the Birmingham City Council, presided over a conference of municipal representatives, and described the sanitary history of Birmingham. Mr. T. de Courcy Meade, City Surveyor of Manchester, was President of a conference of municipal and county engineers; and Mr. W. W. West, Sanitary Inspector of the Walthamstow District Council, filled a similar position with respect to the representatives of his special department of sanitary work. There was also a conference of ladies on "Domestic Hygiene." Mr. W. Henman, of Birmingham, presided in the section devoted to "Engineering and Architecture," and in his address dealt with the important part taken by architects in questions of sanitation. As President of the Physics, Chemistry, and Biology Section, Dr. G. Sims Woodhead delivered an address in which he reviewed some of the important advances made in sanitary science in recent years. In this section, papers on "Water Analysis" were read by Mr. S. Barwise and Mr. C. E. Seyler. On Thursday evening, Dr. C. Childs delivered an address on "The Prevention of Pollution in our Streams and Rivers." He expressed the opinion that the Rivers Pollution Act of 1876 had generally and persistently failed. The chief difficulties in the way of reforms were the ignorance and indifference of the people; the great cost of sewage purification; the uncertainty with regard to the best means to be employed; and last, but not least, the defects in the law itself, and the impotence of the measures provided for its administration. He described the best practicable and available means for destroying pathogenic bacteria in sewage, and pointed out the defects in the above-named Act. The final sittings were held on Friday. In the Engineering Section, Mr. J. Mansergh described to a large audience, by the aid of lantern views and diagrams, the scheme for supplying Birmingham with water from Wales. Four papers were read before the Physics, Chemistry, and Biology Section. Mr. H. Kerwood and Mr. W. Butler contributed a joint paper entitled "Some Observations on the National Purification of Sewage;" Dr. S. Rideal spoke of the quality of sewage as influencing its disposal; Mr. W. D. Scott Moncrieff dealt with the biolysis of sewage; and Mr. W. E. Adeney, with the "Bacterio-Chemical Analysis of Sewage and Sewage Effluents."

The closing meeting was held on Friday evening. Sir Joseph Fayrer occupied the chair, and congratulated the city and the Institute, and those who had attended the congress, upon the result of their deliberations. The Secretary (Mr. E. White Wallis) presented a report showing the attendance. The number of tickets issued to members was 549; to representatives of sanitary authorities and societies, 880; to associates, 400; and complimentary tickets, 150—making a total of 1979, or about 50 per cent. more than at the preceding congress. The attendance at the various sectional meetings ranged from 85 to 260 each; the highest attendance being at the ladies' meetings.

In connection with the congress, there was, as usual, an exhibition of sanitary and other appliances in Bingley Hall; and there were several social functions and excursions.

Public Lighting by Acetylene Gas.—At New Milford, Connecticut, an acetylene-gas plant has just been put down for public lighting purposes, The holder has a capacity of 300 cubic feet, and there are four general tors, each holding 150 lbs. of carbide. The principle is that of continuous supply; water being gradually admitted into one generator until the carbide is consumed, when it is automatically switched to the next generator, and thus the pressure and supply are regularly maintained.

GAS AND WATER COMPANIES STOCK AND SHARE LIST.

Referred to on p. 741.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d.
590,000	10	Apl. 15	10½	Alliance & Dublin 10 p. c.	22½—23½	..	4 9 4
100,000	10	,,	7½	Do. 7 p. c.	16½—17½	..	4 5 9
300,000	100	July 1	5	Australian 5 p. c. Db.	105—107	..	4 13 6
200,000	5	May 26	6	Bombay, Ltd.	6½—7	..	4 5 9
40,000	5	,,	6	Do. New, £4 paid	4½—5	..	4 16 0
380,000	Stk.	Aug. 12	12	Brentford Consolidated	275—280	..	4 5 9
240,000	,,	,,	9	Do. New	210—215	..	4 3 9
50,000	,,	,,	5	Do. 5 p. c. Prf.	140—145	..	3 9 0
159,375	,,	June 10	4	Do. 4 p. c. Db. Stk.	130—135	..	2 19 3
220,000	Stk.	Sept. 15	11½	Brighton & Hove Orig.	262—267	..	4 6 2
226,320	,,	,,	8½	Do. A. Ord. Stk.	190—195	..	4 7 2
933,500	Stk.	Aug. 31	5	Bristol, 5 p. c. max.	125—130	..	3 16 11
420,000	20	Sept. 29	10	British	50—52*	..	3 16 11
50,000	10	Aug. 12	11½	Bromley, Ord. 10 p. c.	25—27	..	4 5 2
75,000	10	,,	8½	Do. 7 p. c.	20—22	..	3 17 3
500,000	10	Apl. 29	6	Buenos Ayres (New) Ltd	9—9½	..	6 6 4
98,122	Stk.	June 29	4	Do. 4 p. c. Db. Stk.	98—100	..	4 0 0
150,000	20	July 14	8½	Cagliari, Ltd.	29—30	..	5 10 0
100,000	10	Sept. 29	7	Cape Town & Dis., Ltd.	15—16*	+½	4 7 6
50,000	50	May 3	6	Do. 6 p. c. 1st Mort.	58—60	..	5 0 0
550,000	Stk.	Apl 15	13½	Commercial Old Stock	315—325	..	4 3 1
200,750	,,	,,	10½	Do. New do.	252—257	..	4 1 8
200,750	,,	June 10	4½	Do. 4½ p. c. Lb. &c.	148—153	..	2 18 10
800,000	Stk.	June 10	12	Continental Union, Ltd.	207—212	..	5 18 2
200,000	,,	,,	9	Do. 7 p. c. Prf.	193—198	..	4 10 11
51,600	Stk	Aug. 31	14	Croydon A 10 p. c.	305—310	..	4 10 4
168,400	,,	,,	11	Do. B 7 p. c.	255—265	..	4 3 0
555,000	Stk.	Aug. 12	5½	Crystal Palace Ord. 5 p. c.	125—130	..	4 0 9
60,000	,,	,,	5	Do. 5 p. c. Prf.	140—145	..	3 9 0
486,090	10	July 28	11	European, Ltd.	23—24	..	4 11 8
354,060	10	,,	11	Do. £7 10s. paid	17—18	..	4 11 9
5,922,230	Stk.	Aug. 12	12½	Gaslight & Coke, A, Ord	292—297	..	4 2 6
100,000	,,	,,	4	Do. B, 4 p. c. max.	120—125	..	3 4 0
665,000	,,	,,	10	Do. C, D, E, 10 p. c. Prf.	307—312	+2	3 4 1
30,000	,,	,,	5	Do. F, 5 p. c. Prf.	152—157	..	3 3 8
60,000	,,	,,	7½	Do. G, 7½ p. c. do.	230—240	..	3 2 6
1,300,000	,,	,,	7	Do. H, 7 p. c. max.	195—200	..	3 10 0
463,000	,,	,,	10	Do. J, 10 p. c. Prf.	307—312	+2	3 4 1
476,000	,,	,,	6	Do. K, 6 p. c. Prf.	182—187	..	3 4 2
1,061,150	,,	June 10	4	Do. 4 p. c. Db. Stk.	131—133	..	3 0 2
294,850	,,	,,	4½	Do. 4½ p. c. do.	148—153	..	2 18 10
958,000	,,	,,	6	Do. 6 p. c. do.	198—203	..	2 19 1
70,000	10	May 12	8	Hongkong & China, Ltd.	14—15	..	5 6 8
3,800,000	Stk.	,,	10	Imperial Continental	220—225	+2	4 8 11
376,400	100	Aug. 2	4	Do. 4 p. c. Dbs. Red.	98—101	..	3 19 3
473,600	Stk.	Aug. 12	3½	Do. 3½ p. c. Db. Stk.	101—104	..	3 7 4
560,000	100	Oct. 1	5	Met. of Mel- 5 p. c. Db.	110—112*	+1½	4 9 3
250,000	100	,,	4½	bourne 4½ p. c. Db.	105—107*	..	4 4 1
				* Ex div.			
200,000	,,	Sept. 15	3	Do. 3 p. c. Db. Stk.	102—105	..	2 17 2
				* Ex div.			

† Next dividend will be at this rate.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

Mr. G. T. Myers, by his letter in the last number of the "JOURNAL," gives his version of the proceedings which led to the formation of Gas Associations. The contribution, coming at a time when people's minds are directed to the question of the origin of these societies, is a valuable one. His testimony may be taken to be that the first association of gas managers was inaugurated at Cupar, in Fifeshire, in the summer of 1861. Mr. J. C. Adamson's story, as given at Duns, was that the Waverley Association was the first, and that the men in Fife had the notion of associating put into their heads by his letter to Mr. Mackenzie, of Cupar. He is vague as to the date; but it was after the formation of a Committee in Denny by Mr. Flintoff, whose first appearance there was in July, 1860. But we are not left in doubt as to the date of the formation of the Waverley Association; for in the minute prepared by the late Mr. Robson, of Selkirk,* it is stated that it was Aug. 5, 1861, and that the place was Kelso. It only needs now that Mr. Myers should be able to fix the date of the meeting of four at Cupar somewhat more particularly than "in the summer of 1861." Unless he and Mr. Adamson can determine the dates more accurately, it will be difficult to arrive at a satisfactory finding on the question of who was first. They are the only survivors; and it is singularly fortunate that at this date—37 years after the time—there should have been two out of six pioneers alive, and that in addition these two should be one from each meeting. Of testimony other than the word of these two gentlemen, there is very little. It will be observed that Mr. Adamson says it was to counteract Flintoff that association was first thought of by himself and Mr. Robson, and that Mr. Myers also says that this was one of the subjects the four of them discussed at Cupar. This would rather tend to support Mr. Adamson's view, that combination for mutual protection was what was intended. But then Flintoff's doings were the cause of alarm everywhere; and the idea of association may have occurred to more than one. The Waverley meeting last month was held as the 75th of that Association, which would carry the organization back to September, 1861. The meeting of the North British Association in Glasgow last July, was held as the 37th of that body, which carries it back only to the summer of 1862; and in the proceedings of the North British Association, the first year of meeting is put down as 1862, the place of meeting as Cupar, and the President Mr. John Lowden, of Leven, Fife. Mr. Robson gives the date of that meeting as Jan. 24, 1862; and he says that the Scottish Association was formed in Edinburgh in April of that year, but that neither Mr. Mackenzie nor Mr. Lowden countenanced it after the first meeting. There is evidence which would be conclusive, if it were in existence—namely, the minute-books of the Waverley Association and of the Association which was formed at Cupar. The Waverley book was lost about the time of the Edinburgh meeting in April, 1862. It is said to have been given to Mr. Mackenzie or else to Mr. Lowden, and to have never been returned by them. If the minute-book of the Cupar meeting be in existence, and should it be established that there has been continuity of existence from the Cupar gathering to the North British Association, it should be in the custody of the Secretary of the North British Association, unless, which is just possible, the representatives of Mr. Mackenzie or of Mr. Lowden may have both books in their possession. Should not an effort be made to try to find out whether or not the books can be recovered?

For some time past the Glasgow Corporation Gas Committee have had under consideration the desirability of doing something in the way of increasing the gas-making power of the city, but not in any formal way. At last, however, they have resolved that it is necessary to take some decided action towards securing ground of sufficient extent on which to erect new gas-works. They have kept their counsel well, for they are most unwilling to let it be known that they have been seeking likely sites—far away from the central parts of the city, having railway accommodation, low-lying, and possessed of other necessary favourable qualifying circumstances.

On Monday the Edinburgh and Leith Gas Commissioners held their first meeting since July. There was a poor attendance, and not much business; the reason being that the deputation which went to the Continent had not then returned. The reports of the Engineer showed an increase of 1,139,800 cubic feet in the output of gas during July, and an increase of 3,699,600 cubic feet during August, as compared with the corresponding months of last year. Since May 16 there has been a total increase over the corresponding period of last year of 5,511,500 cubic feet. This is a comparatively small increase for Edinburgh; but the remarkable weather of the summer has to be remembered. It was so consistently warm and sunshiny, that consumers were able to save gas. The Commissioners have set about in earnest the development of a stove business, which it is possible now to push, the price of gas having been got down to 3s. per 1000 cubic feet. Above this figure there is no inducement to burn gas for cooking and heating. They have now 2694 stoves on hire—an increase of 1133 since May 16. Action has at last been taken against the Commissioners in respect of their donations, on the occasion of the Diamond Jubilee celebrations, to the Edinburgh Royal Infirmary and the Leith Hospital. Two gentlemen—Mr. Andrew Scott, chartered accountant, and Dr. D. C. R. Scott—have been put forward to father the cause; but neither of them is the real objector. The case is to be debated before the Sheriff of Mid-Lothian; the Commissioners having instructed Mr. Thos. Shaw, Q.C., to represent them. One member suggested that the better way might be for the Commissioners to refund the money; but the Commissioners did not respond to this advice. Mr. Waterston, who is a great champion of the working classes, proposed that the same Committee who had had charge of the subject should be entrusted with further powers in the matter. The Commissioners had, he said, a large number of men, some of whom were occasionally getting hurt; and they again and again derived benefits from these institutions. The question was whether they had the power to give donations to institutions which were doing so much good to working people. He thought it was better that the question should be decided, now that it had been raised. Mr. Waterston's suggestion was agreed to.

* See "JOURNAL," Vol. LXIX., p. 850.

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It was reported that the Assessors had valued the Commissioners' undertaking at £55,429, which was an increase of £13,518 over last year. This increase, it was explained, was due to the large surplus which the Commissioners had at the end of their financial year.

Power was given to the Finance Committee to apply to the Corporation of Edinburgh for the terms upon which they would lend money to the Commissioners, to meet the cost of the new works at Granton.

An unsavoury subject came up, in the shape of a claim of £30 by Mr. J. Kay, butcher, of Leith, as the value of meat which, he alleges, was damaged in his shop, in August, by an escape of gas. The escape, it was stated, began on a Friday, but was not reported at the Commissioners' office in Leith till Monday morning. Workmen were sent immediately to attend to the matter; and when they arrived at the claimant's shop, they found that the carcase which was said to have been damaged had been given away by the owner, who stated that he had given it to feed dogs. There was thus no evidence of damage, except the word of the man himself. The man admitted that he had paid £10 for the carcase; and his claim is for £30. Taking everything into account—including the fact that at the time the weather was hot - the Committee recommended the Commissioners to deny liability. This was agreed to.

The Commissioners meet on Monday next to fix the price of gas for the year following the next survey. I understand that there is to be no change. The Commissioners have been fortunate in their coal contracts for the current year; and this is the principal factor which enables them to retain the price of gas at 3s. per 1000 cubic feet. Many other bodies have been very unfortunate in putting off their contracts; and now the price of coal is rising rapidly.

The deputation from Edinburgh to the Continent returned at the end of this week. They visited eighteen different works; and, as may be supposed, their task was not a holiday one, but was real hard work.

In an address to his constituents, on Thursday night, Treasurer M'Crae, of Edinburgh, thought fit to criticize the action of the Edinburgh and Leith Gas Commissioners in proceeding to erect new gas-works at Granton. In view of the fact that electricity is making so much progress in the city, he thought the Commissioners were going in for a bold scheme—not to use a harsher word. Now there is no necessity for Treasurer M'Crae using any word, harsh or otherwise, with reference to the work of the Gas Commissioners. He is not a Commissioner, which may account for his taking the view he does of the matter. Were he familiar with the subject, he would know that the expenditure of the £400,000, which he seems to be alarmed at, is intended to enable the Commissioners to lower the price of gas. That this will be the result, no one doubts; and the opinion of most sensible people will be that if the Commissioners, when they were consulted in the matter by Mr. Herring, their Engineer, had not taken the step they are doing, they would have placed themselves in a position in which the words used regarding them could not by any possibility have been too harsh.

I observe that Treasurer M'Crae has also, in the Town Council, given, as one reason for a rise in the police rates which has taken place, that the cost of gas for public lighting has been increased by the Gas Commission. This he attributed to the circumstance that the Cleaning and Lighting Committee had not been so successful as they ought to have been in making arrangements with the Gas Commission. Now Treasurer M'Crae is not an ignorant man—at least, he is not ignorant of the affairs of the City of which he is so conspicuous an ornament—and he ought to have explained the position more fully. The fact is that the Gas Commission have for nearly ten years undercharged for the gas consumed in the public lamps; and in this way they have been contributing to the relief of the rates to the amount of £4000 annually. This policy would probably have been continued had the whole city been lighted by means of gas, as it was until recently. But now that so large a number of public thoroughfares are lighted by electricity, the Gas Commissioners have felt that it would be unfair to their consumers to undersell gas for public lighting. Even now they charge little more than cost price, so that the ratepayers are not aggrieved.

There are in Scotland many instances of public gas supply being in the hands of the Police Commissioners or Town Councils; but those burghs whose annual manufacture of gas reaches to some 20 million and does not exceed 100 million cubic feet could be counted on one's fingers and toes; in other words, they do not exceed twenty. In such towns and cities as Inverness, Aberdeen, Arbroath, Dundee, Perth, Dunfermline, Edinburgh (including Leith and Portobello), Glasgow, Dumbarton, Paisley, Greenock, Port Glasgow, and Kilmarnock, the corporation supply holds good instead of the company system; and this tendency is for other places, such as Stirling and Helensburgh, to go in for the supply of gas by the local authorities for the townspeople. One of the latest instances in the same direction is that of Portsoy, in Banffshire, the Police Commissioners of which are about to borrow sufficient money to pay for the repair and renewal of the gas-works plant.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Oct.* 1.

Sulphate of Ammonia.—The month of September has closed with a very quiet market, and with a decline in values; the quotations being £9 17s. 6d. per ton f.o.b. Hull and Leith, and £9 18s. 9d. per ton f.o.b. Liverpool. Prompt and early delivery has been neglected by consumers; and middlemen have been able comfortably to complete their September requirements. Supplies have not, however, been over plentiful, although production has been offered everywhere as it has become available. In the forward position, £9 17s. 6d. per ton continues to be makers' quotation for October-March delivery f.o.b. Leith, ordinary terms; but London October-December delivery may now be had at £9 13s. 9d. per ton, Beckton terms. Consumers for the most part seem disposed to wait; but a fair amount of buying has been done at a shade under makers' quotations.

Nitrate of Soda remains quiet; and 7s. 7½d. per cwt. is the spot quotation for fine quality.

LONDON, *Oct.* 1.

Tar Products.—Although tar distillers are paying more money for tar contracts, it is evidently in the expectation of better prices as the season

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advances. So far, however, there is no improvement in the value of products. With the exception of anthracene, there is a fair demand for all the other products; and makers are reported to have small stocks. The continuation of the low prices of benzols and naphthas is remarkable, having regard to the large inquiry, and the business being transacted in them. At the commencement of the week, an effort was made to improve the market quotation of benzols; and they were quoted higher in all positions. But to-day they have relapsed to former figures. Tar oils are scarce; but there is no great pressure for deliveries, buyers being well contracted. A little more life is shown in carbolic acid; and there is a tendency to improved rates. No change is noticeable in that long-neglected article anthracene. At its present low price, few distillers are troubling to extract it. It may be that shortly it will be found that the production has largely decreased, and that the demand has overtaken the make.

Average values may be taken as follows: Tar, 14s. to 19s. Pitch, east coast, 25s.; west coast, 23s. Benzols, 90's, 9d.; 50's, 9¼d. Toluol, 1s. 2d. Solvent naphtha, 1s. 2d. Heavy naphtha, 1s. 1d. Crude, 30 per cent., naphtha, 3¼d. Creosote, 2⅝d. Heavy oils, 45s. to 50s. Carbolic acid, 60's, 2s. Naphthalene, 55s.; salts, 32s. 6d. Anthracene, "A," 4d.; "B," 3d.

Sulphate of Ammonia is weaker all round, and this is the more remarkable as makers have no stocks, and very little sulphate is being offered by anyone. The quoted market values are £9 13s. 9d. to £9 18s. 9d. per ton, according to position and conditions of delivery, in all cases less 3½ per cent. discount.

COAL TRADE REPORTS.

From Our Own Correspondents.

Lancashire Coal Trade.—Though, as previously intimated in these reports, there was no real apprehension that the wages question in the coal trade would result in any serious conflict between the Miners' and the Coalowners' Federation, the decisive majority in favour of accepting the masters' terms, and the definite agreement come to at the joint conference in London last week, have necessarily tended to produce a more settled feeling throughout the market. With the commencement of the month there has been no further really quotable change in prices, so far as Lancashire is concerned, except that in those cases where collieries had only partially put up their list rates in September they have now as a rule levelled them up to the general advance. The position of Lancashire colliery owners is also further strengthened by the upward move in prices that has come into operation in neighbouring competing districts. Common round coals are in active inland demand; but the shipping inquiry has fallen off. Engine classes of fuel are moving away more freely than they have been doing of late. It is only in exceptional cases where any surplus supplies are offering in the market; while prices are firm, with advances quoted in most cases on forward contracts. At the pit mouth, the average prices for this month are about 11s. to 11s. 6d. per ton for best Wigan Arley; 9s. 6d. to 10s. 6d. for Pemberton four-feet and seconds Arley; 7s. 6d. to 8s. 6d., for common round coals; 4s. 9d. to 5s. 3d. for best slack; 4s. 3d. to 4s. 6d., for medium; and 3s. 6d. to 3s. 9d., for common. For shipment, ordinary steam coals average about 9s. 6d. to 9s. 9d. per ton, delivered at the Mersey ports.

Northern Coal Trade.—There is considerable activity in the coal trade of this district; but the tendency of prices is on the whole downwards, more especially for forward delivery, as the closing of the Baltic ports will throw a large quantity of coal on the markets. Best Northumbrian steam coals are quiet at from 9s. 9d. to 10s. per ton f.o.b.; second-class steam are 9s. to 9s. 6d.; and steam smalls, about 5s. 6d. In the gas coal trade there is considerable activity; but the supplies are adequate. For occasional cargoes, as high as 10s. 9d. per ton f.o.b. is asked; but for forward delivery much lower quotations are made, and the price may be taken as from 9s. 6d. per ton f.o.b. upwards. Large deliveries are being made on old contracts, at prices often as low as 6s. 3d. per ton f.o.b. Manufacturing coals are steadier; and there is a fuller demand. Gas coke is being shipped freely; but there is no alteration in price to record this week.

Scotch Coal Trade.—The demand for coal of all descriptions has shown an inclination to slacken, which is attributed partly to the output of coal from South Wales, and partly to a lack of shipping, which has left large supplies on the hands of the merchants. The prices quoted are: Main, 8s. 6d. to 8s. 9d. per ton f.o.b. Glasgow; ell, 9s. 6d. to 10s.; and splint, 9s. 6d. to 9s. 9d. The shipments for the week amounted to 189,371 tons—a decrease of 52,234 tons when compared with the preceding week, but an increase of 30,357 tons over the corresponding week of last year. For the year to date, the total shipments have been 7,235,260 tons—an increase upon the same period of last year of 1,273,236 tons.

The Price of Gas in the Out-townships of Bradford.—The Bradford City Council recently appointed a Sub-Committee to consider the question of equalizing the charges for the supply of gas throughout the whole area of the city. The Sub-Committee have been considering the matter, and at a meeting held last Thursday, says the "Bradford Observer," it was decided unanimously to recommend the City Council to obtain parliamentary powers next session to enable the Corporation to purchase gas in bulk for the supply of districts which are at present within the city boundaries, or may be included by the proposed extension of the city, and which are at present lighted by private Companies. This scheme is, of course, altogether a separate matter from the proposed purchase of the private gas undertakings in any of the out-districts that may be included within the city as the result of the application now before the Local Government Board. Should the Committee's recommendation be adopted, it will be possible for the Corporation to purchase gas from the private Companies and supply it at reduced prices to the citizens who are at present paying a higher rate than that charged by the Corporation within their own area of supply. This could be done pending the negotiations for the purchase of the private undertakings.

JOSEPH AIRD
GREAT-BRIDGE,
STAFFORDSHIRE.
HIGHEST QUALITY
TUBES AND FITTINGS
GAS, STEAM, WATER, GALVANIZED TUBES and FITTINGS in all Sizes.
LARGE TUBES FOR COLLIERIES.
Illustrated Price Lists on Application.
LONDON OFFICES: 46, QUEEN VICTORIA STREET, E.C.

Glenboig Union Fire-Clay Company, Limited.—The accounts of this Company for the year ending the 31st of August last, after providing for maintenance of works and all current charges, and including £825 brought forward, show, subject to completed audit, a gross balance of £16,210. The Directors have decided to recommend to the shareholders that this sum be disposed of in the following manner: For depreciation on capital expenditure, £2000; in payment of a dividend at the rate of 10 per cent., £13,500—leaving a balance of £710 to be carried forward.

Guildford Gaslight Company.—The half-yearly meeting of this Company was held last Thursday. The report and accounts showed that the anticipation of the Directors had been realized as to the improved efficiency and economical working arising out of the re-modelling and extension of the works. Increased business had already been derived from the supply of prepayment meters and cooking-stoves; and further extension was expected in this direction. It was announced that the sale by auction of £5000 ordinary stock in July last realized a premium of £1006 10s. Resolutions were passed for the payment of the full dividends; and an increased balance was carried forward to the profit and loss account. At a subsequent extraordinary meeting, it was agreed that £15,000 ordinary stock should be raised for the completion of the payment of the outlay on the works.

Chard Water Supply.—Mr. F. H. Tulloch, one of the Inspectors of the Local Government Board, recently held an inquiry at Chard with reference to an application by the Town Council for power to borrow £2500 for works of water supply. Mr. J. Howard Bowen, Solicitor, appeared on behalf of the Council, who, it was pointed out, contemplated laying new water-mains in place of the existing ones, which were old and defective. The present water supply is derived from springs just above the centre of the town; and the parts situate at a higher level than the springs are without any town supply. Opposition was offered to the scheme by residents outside the area, on the ground that it would be unfair to charge them with a share of the cost of laying pipes from which they would derive no benefit; and it was urged that the Council should carry out a proper scheme of water supply for the whole borough.

West Gloucestershire Water Company.—The half-yearly meeting of this Company was held at Bristol on the 24th ult.—Mr. E. Horton presiding. The report of the Directors stated that during the six months ending Aug. 27, 197 additional services had been laid on, making the number of houses and other properties supplied by the Company at that date 6379, which, together with some meter and miscellaneous supplies, were estimated to produce a rental of £5879 per annum. This was an increase of £260 in the six months. To this must be added about £150 for rent of property; making a total estimated annual income of £6029. The accounts showed that there was a net profit of £1873, which, with the £136 brought forward, made a total of £2009 to the credit of revenue. From this balance the Directors recommended the declaration of a dividend at the rate of 4 per cent. per annum. This would absorb £1818, and leave a balance of £191 to be carried to the credit of the current half year. The report was adopted.

The Coalville District Council and the Gas-Works.—At the meeting of the Coalville District Council last Wednesday, it was decided to take steps for the acquisition of the Gas Company's undertaking.

The Gas Supply of Vienna.—Reference was made to this subject in the "JOURNAL" for the 13th ult., when it was stated that negotiations which had taken place between the Imperial Continental Gas Association and Dr. Lueger, the Vienna Burgomaster, had resulted in the renewal of the Association's concession for the greater part of the city. The terms thereof were published last Sunday; and, according to the correspondent of the "Daily Chronicle," the Association get a new contract for lighting the suburbs up to the year 1911. He says, however, it is asserted that a secret arrangement, opposed to the interest of gas consumers, has been made between the Town Council and the Association. The Council knew the Association were intending to considerably lower the gas rates in the suburbs; so they arranged that any alteration should require the consent of both parties—viz., the Association and the Municipality. He adds that the present rates will in all probability remain in operation throughout Vienna up to the year 1911.

Dorking Gas Company.—At the half-yearly meeting of this Company on Tuesday, it was reported that there was a balance of £2516 available for distribution; and the Directors recommended the payment of the maximum dividends on all classes of shares, which would leave £1591 to be carried forward. During the half year the net selling price of gas to private consumers had been 3s. 6d. per 1000 cubic feet, and for public lighting 3s. 1d., as compared with 3s. 7d. and 3s. 2d. The extremely mild and bright weather which prevailed during the March quarter seriously checked the demand for gas for both heating and lighting, and resulted in a decreased consumption as compared with the same period of the previous year; but during the June quarter, the satisfactory increase of 8 per cent. had been registered—3½ per cent. of which was due to prepayment consumers, and 4½ per cent. to additional ordinary consumers and stoves. It was mentioned by the Chairman (Mr. W. T. Butler) that a new oil-gas plant had been completed, and was working with satisfactory results. The report was adopted.

Halesowen in Darkness.—The difference between the Halesowen Gas Company and the District Council (to which reference was made a fortnight since) has brought about a somewhat serious state of affairs; and the inhabitants are viewing with some alarm the approaching winter season. For a month the town and the surrounding districts have been in total darkness; the Gas Company having ceased to light the public lamps at night in consequence of the dispute. For some time past there has been an agitation against the price charged by the Gas Company; but the Company have, it is stated, reduced the price 5s. per lamp in view of the coming season. But, as they have incurred considerable expenditure in laying down mains, they have asked the Council to enter into a three years' contract. This the Council decline to do; and hence the deadlock. Unless some amicable settlement of the dispute is arrived at shortly, it is stated that an appeal will be made by the inhabitants for the intervention of the Local Government Board, with the view of bringing to an end the present undesirable state of affairs.

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W. H. PEARSON, Chairman.
W. H. PEARSON, Junr., Deputy-Chairman.
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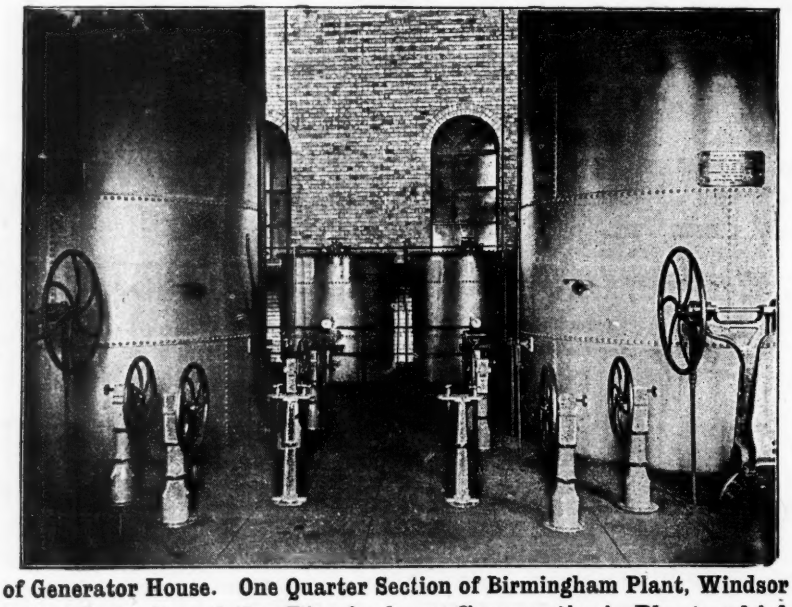

RESULTS PROVE EFFICIENCY.

Working Floor of Generator House. One Quarter Section of Birmingham Plant, Windsor Street Station.
The Maximum Daily Capacity of the Birmingham Corporation's Plant, which was erected by this Company, is 10 MILLION CUBIC FEET.

Bolton Gas Supply.—Last Thursday, Alderman Miles, J.P., the Chairman of the Bolton Corporation Gas Committee, delivered an interesting address on "Gas: How it is Made, Distributed, and Consumed." He gave a sketch of the progress of the Bolton gas undertaking; and made his various points clear by means of diagrams. He received a hearty vote of thanks from the audience.

New Joint Stock Companies.—The Farnham Gas Company, Limited, has been registered with a capital of £20,000, in £10 shares. The Hungarian Lighting Syndicate, Limited, has been formed with a capital of £4000, in £1 shares, to carry on in Hungary the manufacture and sale of carbide of calcium, produce and supply acetylene gas, and make and deal in apparatus therefor. The Stevenston Gas Company, Limited, has been registered in Edinburgh to acquire and take over as a going concern the undertaking, partnership, or firm, of the Stevenston Gaslight Company. The capital is £4000, in £1 shares.

Trouble with Gas Workers Averted at South Shields.—Early in the week there was a prospect of the proceedings at the meeting of the North of England Association of Gas Managers being slightly marred by a labour trouble at the works of the South Shields Gas Company, of which Mr. J. H. Penney, the Hon. Secretary and Treasurer of the Association, is Secretary. It appears that some six weeks ago an application was made for an advance of wages by the workmen, who are members of the Gas Workers' Union. It went before the Directors, who deferred the matter for the purpose of gathering information as to the rates paid for similar work elsewhere; but nothing had been decided. As the men conceived the idea that the Directors were delaying the settlement of the question longer than was necessary, they decided to tender their notices, which were to terminate last Saturday, unless the Directors in the meantime showed a desire to come to terms. It is gratifying to find that trouble was averted by the withdrawal of the notices.

Sales of Stocks and Shares.—Last Tuesday, Messrs. Hollis and Webb sold, at Leeds, six original £5 "A" shares (10 per cent.) in the Drighlington and Gildersome Gas Company, Limited, for £53; sixteen similar shares, for £140; three £10 "B" shares (7 per cent.), for £37 10s.; five similar shares, for £58; and six on which £2 had been paid, for £20. On the same day, some additional shares in the Plymouth Gas Company were sold for £24 2s. 6d. to £24 10s. each; and some original shares in the Devonport Gas Company, at £11 10s. apiece. At Eastbourne, on Wednesday, ten "B" £10 shares in the Eastbourne Gas Company changed hands—seven at £27 10s., and three at £27 7s. 6d. each. At a recent sale by auction at Winchester, Messrs. Gudgeon disposed of two original £25 shares in the Winchester Water and Gas Company (with accruing dividend) for the sum of £62. Messrs. Raynbird have lately disposed of some shares in the Basingstoke Gas Company, at the following figures: Ten lots of £10 original "A" stock, from £25 to £25 10s. per lot; four lots of £10 "A 2" stock, £12 10s. to £13. Mr. W. Askew sold at the Lion Hotel, Worksop, last week, two lots of £5 shares, bearing 7 per cent. dividend, in the Worksop Gas Company, at £8 10s. per share.

Water Scheme for the Maldon District.—Last Thursday, Major-Gen. H. D. Crozier, R.E., held an inquiry in respect of an application to the Local Government Board by the Maldon District Council for sanction to borrow £10,775 for a water supply scheme for the parishes of Althorne, Cold Norton, Hazeleigh, Latchingdon, North Fambridge, Purleigh, Stow Maries, and Woodham Mortimer, the necessity for which was emphasized by Dr. J. C. Thresh, the Medical Officer of Health to the Council.

A Gas-Light Patentee's Failure.—Under the failure of Thomas Rowan, of 14, St. Mary Axe, E.C., and formerly of Leamington, the patentee of Rowan's mantleless gas-light, the first meeting of creditors was held last Wednesday, at the London Bankruptcy Court, before Mr. Pope, Assistant-Receiver. The debtor furnished accounts showing debts amounting to £441; and assets, consisting of furniture, of £250. The meeting refused to grant any further delay, and passed resolutions for the estate to be wound up in bankruptcy, and the appointment of a Trustee and Committee of Inspection.

Gas Consumption at Nice.—The Société Technique du Gaz en France, it may be remembered, held their last meeting at Nice; and an account of the gas and electricity works in that city, which were visited by the members, is given in the recently issued volume of Transactions. We find that in 1880 the consumption of gas was about 105 million cubic feet; ten years later it was 230 millions; and last year, it was 344 millions. The price is 3s. 5d. per 1000 cubic feet for public lighting, 5s. 8d. for ordinary purposes, and 4s. for heating and motive power. The Company lay on the gas and supply three burners and various cooking and heating appliances free; and no rental is charged for their use or for the meter. The consumer has to pay for his gas an all-round price of 5s. 8d. per 1000 cubic feet. At the commencement of the present year, there were 5710 consumers supplied from 1150 rising mains; the total number served in this way and by outside branch-pipes being 10,663. There were 102 gas-engines, representing 607-horse power, at work. In the public lighting department, 2267 burners, passing 3½ to 5 cubic feet per hour, were employed.

Mr. Percy Griffith, Assoc.M.Inst.C.E., who has succeeded to the practice of the late Mr. Jabez Church, has removed to his new offices at No. 54, Parliament Street, S.W.

The Westminster Vestry have given permission to the Fluto Hot Water Syndicate, Limited, to fix two of their lamps for supplying the public with hot water, coffee, &c., to be erected in Westminster. These lamps have been described in our columns.

Contract No. 12 of the Elan aqueduct of the Birmingham Corporation Water-Works (embracing the section from Cleobury Mortimer to Hagley) has been let to Messrs. Morrison and Mason, Limited, of Glasgow, at £412,446. They are already the Contractors for three sections of the aqueduct; and the new contract places the continuous length from Dolau to Hagley—a total of 51¼ miles—in their hands.

GAS PURIFICATION AND CHEMICAL COMPANY, LIMITED.

OXIDE OF IRON.

O'NEILL'S Oxide has a larger annual sale than all other Oxides combined. Purity and uniformity of quality guaranteed.

JOHN WM. O'NEILL, Managing Director,
160, 161, & 162, PALMERSTON BUILDINGS,
OLD BROAD STREET,
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ANDREW STEPHENSON, AGENT. All communications re Oxide to the Company as above.

WINKELMANN'S "VOLCANIC" and "VOLCUM" CEMENT. Fire Resistance up to 4500° Fahr. In use in Gas-Works all over the World.

ANDREW STEPHENSON,
182, PALMERSTON BUILDINGS,
OLD BROAD STREET,
LONDON, E.C.

Telegrams: "Volcanism, London."

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM.
First-Class Award, Melbourne Exhibition, 1889, for WET AND DRY GAS-METERS, STATION METERS, AND GOVERNORS, PRESSURE-GAUGES, STREET LAMPS AND PILLARS, &c.
Telegraphic Address: "Braddock Oldham."

SULPHURIC ACID.

JOHN NICHOLSON & SONS, Limited, Chemical Works, Leeds, specially produce this ACID from SULPHUR, for making SULPHATE OF AMMONIA of high quality and *good* colour. Delivery in our own Railway Tank-Wagons or Carboys. Highest references and all particulars supplied on application.

PORTER & CO., Gowts Bridge Works, LINCOLN, Engineers, Ironfounders, and Contractors for the erection of Gas-Works for Towns, Villages, Mansions, Manufactories, Collieries, and Isolated Buildings at home and abroad. Manufacturers of Retorts and Fittings, Condensers, Scrubbers, Purifiers, Valves, &c.; also of Girders, Wrought and Cast Iron Tanks, Iron Roofs, &c.
Telegraphic Address: "PORTER LINCOLN."
[For Illustrated Advertisement, see p. 780.]

GAS PURIFICATION.

OXIDE OF IRON BOG ORE.

BALE & CO.'S Oxide of uniform quality. SPECIAL FIRE CEMENT, OXIDE PAINTS OILS, SULPHURIC ACID, &c.
190 and 191, NEWGATE STREET, LONDON, E.C.
Telegrams: "BOGORE, LONDON."

SPENT OXIDE wanted.
BROTHERTON AND CO., Chemical Manufacturers.
Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

SADLER & CO., Ld., Middlesbrough; ULVERSTON (BARROW); PORTSMOUTH; CARLTON (N.E.R.); and STOCKTON. Tar and Petroleum Distillers. Benzol and Petroleum Spirit, 700 and other Gravities specially prepared for Carburetting. SOLAR OIL for Gas Making, Kerosene, &c.
Correspondence invited.
Telegraphic Address: "SADLER, MIDDLESBROUGH."

AMMONIACAL LIQUOR wanted.
BROTHERTON AND CO., Ammonia Distillers.
Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

GWYNNE & BEALE'S
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GAS-EXHAUSTERS AND STEAM-ENGINES
FOR FULL PARTICULARS, APPLY TO THE MAKERS:
GWYNNE & CO.,
Telegrams: "GWYNNEGRAM, LONDON."
HYDRAULIC AND GAS ENGINEERS
Telephone No. 95 Holborn.
(Late Essex Street Works, Victoria Embankment, London),
BROOKE STREET WORKS, HOLBORN, LONDON, E.C.

NOTICE TO ADVERTISERS.—COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office *not later* than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or Stoppages of, PERMANENT ADVERTISEMENTS should be received not later than the FIRST POST on SATURDAY.

BROTHERTON & CO.
Offices: Commercial Buildings, LEEDS. Correspondence invited.

TUBES for Gas, Steam, and Water (all Sizes) Welded or Riveted. TANKS, HYDRAULIC MAINS, RETORT-LIDS, &c.
JOHN SPENCER, Globe Tube Works, WEDNESBURY; and 14, Great St. Thomas Apostle, LONDON.

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SPECIALLY favourable terms for Cycles. First-Class Workmanship and Material guaranteed. Art Catalogue post free.
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IMPORTANT.
REPAIR your old Retorts with Patent STICKFAST FIRE CEMENT. Unequalled for Repairing Inclines. Estimates for all kinds of Retort-Settings.
Write CROWTHER, Retort Setter, and Sole Maker of Stickfast Fire Cement, Manor Street, HUDDERSFIELD.

NEW GAS PLANT CEMENT.
JOHN E. WILLIAMS AND CO.,
VICTORIA PAINT WORKS, MANCHESTER.
For all Joints in connection with Oil-Gas Plant and Sulphate Plant.
For all Gas Joints.
For all Tar Joints.
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CANNEL, COAL, ETC.
JOHN ROMANS & SON, EDINBURGH, Gas Engineers, supply all the most approved SCOTTISH CANNELS; also FIRE-CLAY GOODS, CAST-IRON PIPES, and other APPARATUS for GAS and WATER WORKS.
Prices, &c., will be forwarded on application to No. 80, ST. ANDREW SQUARE, EDINBURGH, / NEWTON GRANGE, NEWBATTLE, DALKEITH, } SCOTLAND.

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GAS TAR wanted.
BROTHERTON AND CO., Tar Distillers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

SULPHATE OF AMMONIA SATURATORS.
JOSEPH TAYLOR & CO., Chemical Plumbers, &c., and Makers of every description of Solid Plate Lead and Timber Cased Saturators, &c., CENTRAL PLUMBING WORKS, TOWN HALL SQUARE, BOLTON. Special attention to Repairs.
Before placing Orders, please write for Estimate.
Telegraphic Address: "SATURATORS, BOLTON."

GAS CARBON Wanted, not less than 4-Ton Loads.
Apply to the BRIMINGTON CARBON COMPANY, Sowerby Bridge, YORKS.

HUTCHINSON BROTHERS, Gas Engineers, &c., Falcon Works, Barnsley, Makers of Wet and Dry Gas-Meters, Brass-Work, and general Gas Apparatus, Lead Saturators, Tanks, &c., Tools, and Gas-Works Sundries. (See p. 718, last week's issue.)
Telegrams: "HUTCHINSON BROS., BARNSLEY."

WANTED, Carbon in 4 Ton Lots, or more; also OIL CARBON.
State Price, f.o.r. at nearest Station, to No. 3031, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

HYDRATED OXIDE OF IRON.
PREPARED from pure Iron.
Two or three times as rich as Bog Ore.
Strong action on Sulphuretted Hydrogen.
To be used alone, but will increase activity of other Oxides.
Less than half the price of Bog Ore.
Can be lent on hire.
Write for tabulated results.
READ HOLLIDAY AND SONS, LIMITED, HUDDERSFIELD.

YOUNG Man requires re-engagement as METER INSPECTOR and FITTER. Good References.
Address No. 3141, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

GAS MANUFACTURE EXAMINATION.
GENTLEMEN wishing to be prepared for the City and Guilds Examination can be so by a QUALIFIED TEACHER—Ordinary or Honours Grade. Successes last Examination: Prize and Medal, Honours; Prize and Medal, Ordinary Grade.
Address No. 3140, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a Working Manager for the Worle Gas Company, Limited. Must understand Main Laying and ordinary Fitting Work.
Apply, by letter, to the CHAIRMAN, stating Wages, without House and Coal, by the 10th day of October.

WANTED, for a large Gas-Works, a YOUNG MAN who has had experience in a Gas-Works Laboratory and Coal-Testing Plant, also with a knowledge of Drawing Office routine. Good opening for suitable person. Salary to commence, 35s. per week.
Applications, stating Age and Experience, to be sent in not later than Tuesday morning, Oct. 11, accompanied by not more than three *copies* of recent Testimonials, to No. 3139, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

CHIEF CLERK wanted, accustomed to the routine of a Gas Office. Commencing Salary £2 per week, rising by yearly increments of £5, to £120. Must not be less than 30 years of age.
Applications (which will be considered strictly confidential), with *copies only* of not more than two recent Testimonials, giving full Particulars of Experience, &c., to be sent to the undersigned not later than Saturday, Oct. 8.
WILLIAM S. M'GREGOR, Engineer and Secretary.
Gas Department, Longton.

SECRETARY WANTED.
THE Directors of the Sheppy Gas Company are desirous of receiving APPLICATIONS from duly qualified persons, to undertake the duties of SECRETARY in December next. The Salary will be £200 per annum, without Residence. The applicant must be between 30 and 40 years of age, and have a good knowledge of up-to-date Gas Business, including Prepayment Meters, Stoves, Ranges, and General Fittings, on sale or hire, as well as regular Secretarial Work. He will have the assistance of a thoroughly good Assistant and Collector, who resides at the Office. One previously engaged under a Provincial Company will be preferred.
Applications in own writing to be addressed to the Chairman, Gas Office, 2, Trinity Road, Sheerness-on-Sea, endorsed "Secretaryship," and be delivered not later than the first morning delivery on Wednesday, the 12th of October next.
By order,
A. W. MARKS, Secretary.
Gas Company's Office, Sheerness-on-Sea, Sept. 14, 1898.

GASHOLDER for Sale, 100 ft. diameter by 20 ft. deep, in good working condition. Can be seen working up to the middle of October at the Gas-Works, Ramsgate.
CLAYTON, SON, & CO., LTD., Gas Engineers, Hunslet, LEEDS.

FOR SALE—Four Purifiers, 12 feet square, 6 feet deep, with 12-inch Connections and 12-inch Dry Centre-Valve.
Can be seen at a Gas-Works in the Midlands. No reasonable offer will be refused.
Apply, by letter, to No. 3138, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. **Compare Prices and Particulars before ordering elsewhere.**
J. F. BLAKELEY, Gas Engineer, Ravensthorpe, YORKS.

FOR SALE—One Station Meter (3-inch Inlet and Outlet, connection to Bye-Pass 4 inch), in good working order; one HYDRAULIC MAIN, U, 18-inch, 6 ft. 9 in. long; five ARCH-PIPES and DIPS, 4-inch; four MOUTHPIECES, 15-inch, round, with LIDS.
Address F. M. MAULDON, Secretary, Gas Company, MANNINGTREE.

TODMORDEN CORPORATION.

TENDERS FOR OXIDE.

THE Gas Committee of the above Corporation are prepared to receive TENDERS for the supply and delivery at the Todmorden Railway Station of the under-mentioned goods—viz.,
120 Tons of NATURAL BOG ORE.
120 Tons of PREPARED OXIDE,
Also for the purchase of 220 Tons of SPENT OXIDE, containing about 56 per cent. Sulphur.
Parties tendering may quote for the exchange of New Oxide for Spent.
Particulars and Form of Tender may be obtained from the Gas Engineer, Mr. H. Hawkins.
Tenders, sealed and endorsed "Tender for Oxide," to be addressed to the Chairman, Gas Committee, and delivered at the Town Clerk's Office, Town Hall, Todmorden, not later than Wednesday, Oct. 12, 1898.
The Committee do not bind themselves to accept the lowest or any Tender.
By order,
H. HAWKINS, Engineer.
Gas-Works, Todmorden, Sept. 30, 1898.

LEIGH URBAN DISTRICT COUNCIL.
(GAS DEPARTMENT.)

THE Gas Committee of the above Council are prepared to receive TENDERS for the carrying out of various Works in connection with the alterations of a Bench of Inclined Retorts.
Plans and Copies of Specification, with Terms and Conditions of Tender, may be obtained at the Office of the Engineer, Mr. John Foster, Gas-Works, Leigh, Lancashire, on and after Thursday, the 29th of September, 1898, on payment of Three Guineas, which sum will be returned on receipt of a *bonâ fide* Tender.
Sealed Tenders, endorsed "Tender for Inclined Retorts," must be addressed to me at the Town Hall Leigh, and delivered on or before Twelve o'clock noon on Friday, the 14th day of October, 1898.
The Committee do not bind themselves to accept the lowest or any Tender.
By order,
PEREGRINE THOMAS, Clerk and Solicitor.
Town Hall, Leigh, Lancs., Sept. 22, 1898.

COUNTY BOROUGH OF HALIFAX.

FIRE-CLAY GOODS.

THE Corporation of Halifax are prepared to receive TENDERS for the supply of FIRE-CLAY GOODS for Inclined Retorts to their Gas-Works during the period ending the 31st of December, 1898.
Specification, Form of Tender, and Print may be obtained on application to Mr. Thos. Holgate, Gas Engineer, Gas-Works, Halifax.
Sealed Tenders, endorsed "Fire-Clay Goods," are to be sent to the undersigned not later than Wednesday, the 12th of October, 1898.
The person whose Tender is accepted will be required to observe the Fair Contracts Clauses adopted by the Corporation.
The Corporation do not bind themselves to accept the lowest or any Tender, and are at liberty to accept such portions of any Tender for the goods as they think fit.
By order,
KEIGHLEY WALTON, Town Clerk.

KING'S LYNN GAS COMPANY.

Issue of £1000 PREFERENCE FOUR PER CENT. STOCK, under the King's Lynn Gas Order, 1888, confirmed by the Gas Orders Confirmation (No. 2) Act, 1888, and £6400 PREFERENCE FOUR PER CENT. STOCK, under the King's Lynn Gas Order, 1898, confirmed by the Gas Orders Confirmation (No. 1) Act, 1898.

NOTICE is Hereby Given, that, on the 8th of October, 1898, the Directors will receive TENDERS for the purchase of the ABOVE STOCK in 74 Lots of £100 each.
Printed Conditions and Forms of Tender may be had on application, by post or otherwise, to the Manager, Gas-Works, King's Lynn, or to the undersigned.
By order,
J. J. COULTON / F. H. PARTRIDGE } Clerks.
King's Lynn, Sept. 6, 1898.

SCARBOROUGH GAS COMPANY.

SALE BY TENDER OF NEW ORDINARY STOCK.
In Pursuance of the Scarborough Gas Act, 1895.

NOTICE is Hereby Given, that it is the intention of the Directors of this Company to SELL BY TENDER NEW ORDINARY STOCK of the Company, to the amount of £16,000, such Stock to bear a Maximum Dividend of 5 per cent. per annum, and to be paid up in full on or before the 1st day of December, 1898; being a portion of the Additional Capital authorized to be raised under the powers of the above-named Act, by a Resolution passed at a Meeting of the Proprietors of the Company, specially convened for the purpose, and held on the 26th day of June, 1895.
Particulars and Condition of Tender may be obtained on application at this Office, and sealed Tenders must be sent in not later than Twelve o'clock at noon on the 1st day of November, 1898.
By order,
J. HOLLIDAY, Secretary.
Scarborough Gas Company's Offices, 32, Westborough, Scarborough, Sept. 15, 1898.

HOYLAKE AND WEST KIRBY GAS AND WATER COMPANY, LIMITED.

SALE OF SHARES (GAS UNDERTAKING ONLY), STANDARD DIVIDEND 7 PER CENT., SUBJECT TO SLIDING-SCALE.

PURSUANT to the Provisions of the Hoylake and West Kirby Gas Order, 1897, I Hereby give Notice of the intention of the above-named Company to offer for SALE BY TENDER, not more than ONE THOUSAND AND SEVENTY-NINE SHARES of the nominal value of FIVE POUNDS each; being the balance of £9000 New Capital authorized to be raised for the purposes of the Gas Undertaking under the terms of the afore-mentioned Hoylake and West Kirby Gas Order, 1897.
Forms and Conditions of Tender may be obtained from the undersigned, to whom sealed Tenders, marked "Capital Tender," must be delivered not later than Ten a.m., on Wednesday, the 12th day of October next.
ARTHUR GEO. READDY, Secretary.
Dated Sept. 17, 1898.
Registered Offices:
8, Filey Terrace, Hoylake.

BRISTOL GAS COMPANY.

IMPORTANT ISSUE OF
GENERAL CAPITAL STOCK
AND
NEW DEBENTURE STOCK.

GEO. NICHOLS, SMITH, AND ALDER are instructed to SELL BY PUBLIC AUCTION, at their Sale-Rooms, 49, Broad Street, Bristol, on Thursday, the 27th day of October, 1898, at Two p.m. precisely,

IN LOTS OF £100 EACH,
£20,000
FIVE PER CENT. MAXIMUM
GENERAL CAPITAL STOCK
AND
£5000
NEW DEBENTURE STOCK

Bearing Interest at the Rate of Four Pounds per cent. per Annum, payable Half Yearly in June and December,
OF AND IN
THE BRISTOL GAS COMPANY,

Issued by the Company under their Statutory Powers.

The Stock will be Sold and Registered in the Books of the Company FREE OF EVERY EXPENSE to Purchasers thereof.

Full Particulars and Conditions of Sale may be obtained of the AUCTIONEERS, 49, Broad Street, BRISTOL; Messrs. BRITTAN, LIVETT, AND MILLER, Solicitors, Albion Chambers, BRISTOL; or of
JOHN PHILLIPS,
Secretary.

Chief Office: Canon's Marsh, Bristol.

THE Acetylene Illuminating Company, Limited, 63, Queen Victoria Street, London, E.C., GIVE NOTICE that they hold the BRITISH PATENT RIGHTS for the MANUFACTURE OF CALCIUM CARBIDE by means of the electric furnace, that they are bringing an action against the Midland Acetylene (Parent) Syndicate, Limited, to restrain them from so manufacturing that product, and that they intend in the future to bring actions against all infringers of these Patents and all purchasers or users of Carbide of Calcium made in infringement of the same.

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THE LOTHIAN COAL COMPANY,
LIMITED,
NEWBATTLE COLLIERIES,
DALKEITH, N.B.

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his AUCTIONS of STOCKS and SHARES in London, Suburban, and Provincial Gas and Water Companies are held MONTHLY, at the Mart, Tokenhouse Yard, E.C.

He also undertakes the issuing by Auction of Gas and Water Stocks and Shares under Parliamentary Powers.

Terms for issuing such Capital, and also for including Gas and Water Stocks and Shares in these periodical Sales, can be obtained on application at Mr. Alfred Richards's Offices, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
ALLIANCE AND DUBLIN CONSUMERS' GAS COMPANY.

£22,900 FOUR PER CENT.
PERPETUAL DEBENTURE STOCK,
Offering to Trustees and others an Investment of the highest class.

MR. ALFRED RICHARDS will Sell THE ABOVE BY AUCTION, at the Mart, Tokenhouse Yard, London, E.C., on Tuesday, Oct. 18, 1898, at Two o'clock precisely, in Lots.

Particulars at the HEAD OFFICES OF THE COMPANY, in D'Olier Street, DUBLIN; and of the AUCTIONEER, 18, Finsbury Circus, LONDON, E.C.

By order of the Directors of the
PLYMOUTH AND STONEHOUSE GASLIGHT AND COKE COMPANY.

MR. ALFRED RICHARDS will Sell BY AUCTION, at the Mart, E.C., on Tuesday Oct. 18, at Two o'clock, in Lots,
£10,000 OF ORDINARY STOCK
OF THE
PLYMOUTH AND STONEHOUSE GASLIGHT AND COKE COMPANY,
Ranking for a Standard Dividend of 5 per cent., subject to the Sliding-Scale; the last Dividend on similar Stock in the Company having been at the rate of 6½ per cent.

Particulars may be obtained at the COMPANY'S OFFICES, 1, Athenæum Terrace, PLYMOUTH; and of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
SOUTHEND WATER-WORKS COMPANY.

MR. ALFRED RICHARDS will Sell BY AUCTION, at the Mart, E.C., on Tuesday, Oct. 18, at Two o'clock, in Lots,
500 £10 SHARES
(issued as fully paid) in the above Undertaking, ranking for a Maximum Dividend of 7 per cent.; the last Dividend on similar Shares having been 5½ per cent.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Executors of the late G. E. Wood, Esq.,
339 £10 SHARES IN THE
HAMPTON COURT GAS COMPANY
AND THE
WALTON-ON-THAMES AND WEYBRIDGE GAS COMPANY.

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With Elevators and Conveyors worked by Steam or Gas Engine.

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Latest Analysis—By CHARLES PHILLIPS, Gas Examiner to Rotherham Corporation

Yield of Gas per Ton . . .	11,205 Cubic Feet.
Illuminating Power	$16\frac{7}{10}$ Stand. Sperm. Candl.
Coke (of good & pure quality)	$13\frac{3}{4}$ Cwt. per Ton.
Sulphur	A little over 1 per Cent.
Ash	Under 1 per Cent.
Tar	163 lbs. (Avoir.) per Ton.
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HOLMSIDE GAS COALS are supplied to the largest Gas Companies in England and on the European Continent; London alone consuming about half the produce.

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Yield of Gas 11,000 cubic feet per ton of Coal as per analysis by
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Illuminating Power . .	16·9 Candles.
Coke (of good quality) . .	67·5 per Cent.
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Illuminating Power	38·22 candles
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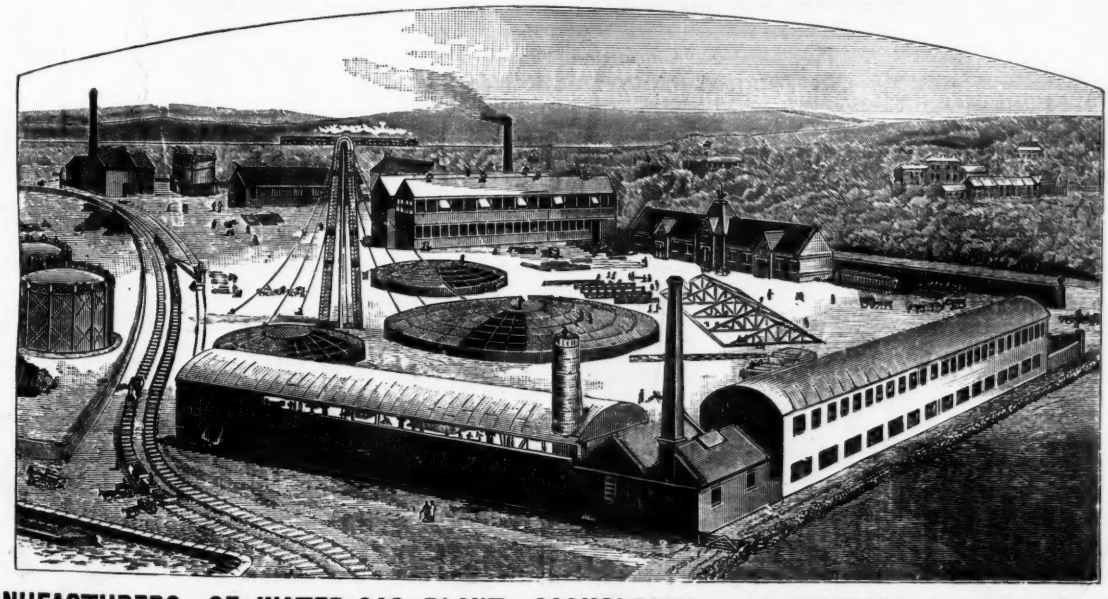

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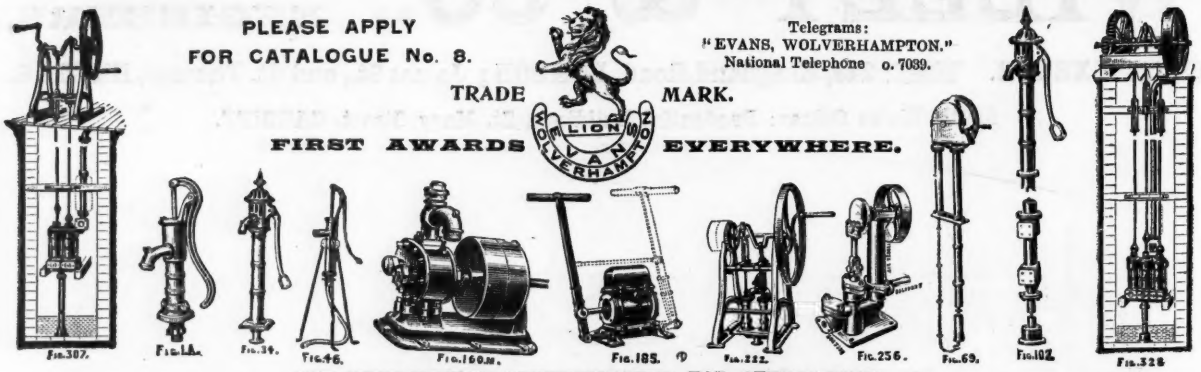

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1000 DURABILITY AND SIMPLICITY OF MANAGEMENT. LOWEST POSSIBLE FUEL ACCOUNT. PERFECT SATISFACTION GUARANTEED.

CUBIC FEET OF GAS PER LINEAL FOOT OF RETORT (Ordinary Section) per 24 HOURS from ENGLISH COAL, and

1200 CUBIC FEET FROM SCOTCH COAL,

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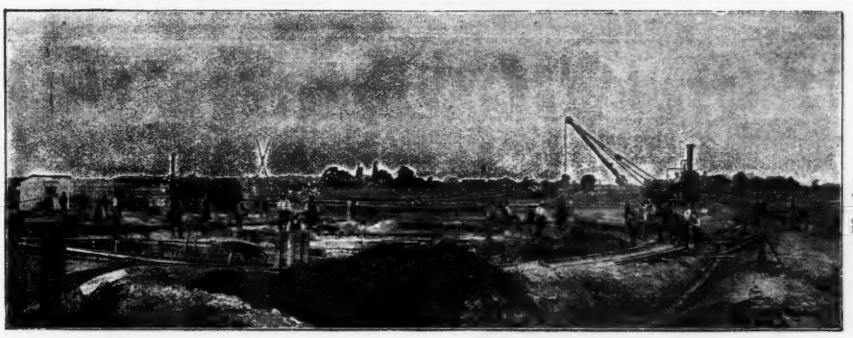

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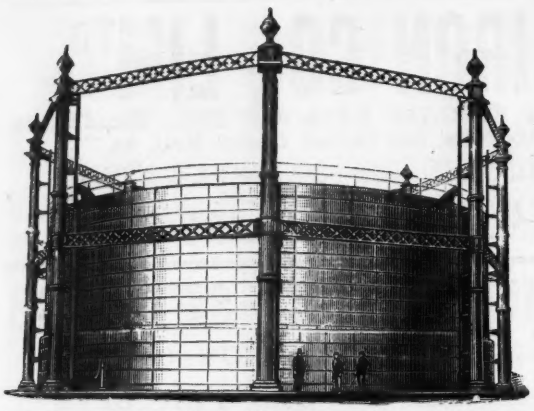

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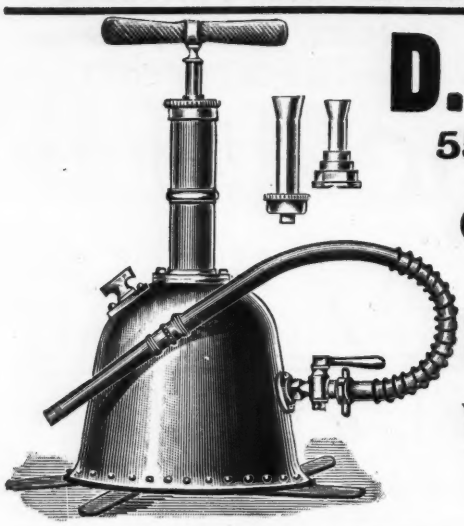

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Milne's	Meter due per Index	3/4	Cash in Box	3/4
Milne's	,, ,,	4/2	,,	4/2
Milne's	,, ,,	2/6	,,	2/6
Milne's	,, ,,	3/4	,,	3/4
Milne's	,, ,,	2/6	,,	2/6
Two other Makers.	,, ,,	6/8	,,	6/11
	,, ,,	1/8	,,	2/0
	,, ,,	3/9	,,	5/2
	,, ,,	2/6	,,	2/8
	,, ,,	4/7	,,	6/0

Above Results confirmed on further comparison.

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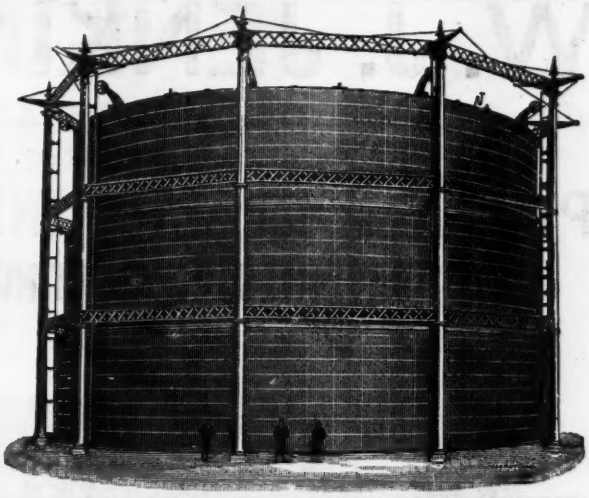

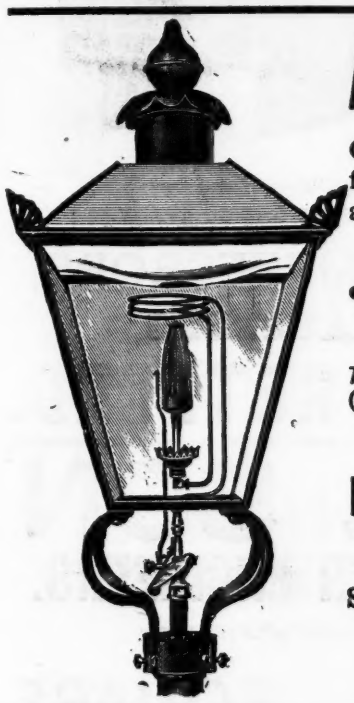

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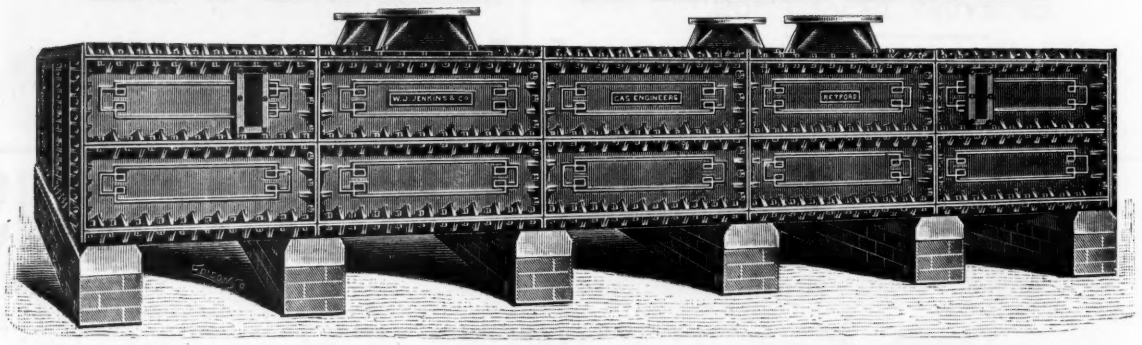

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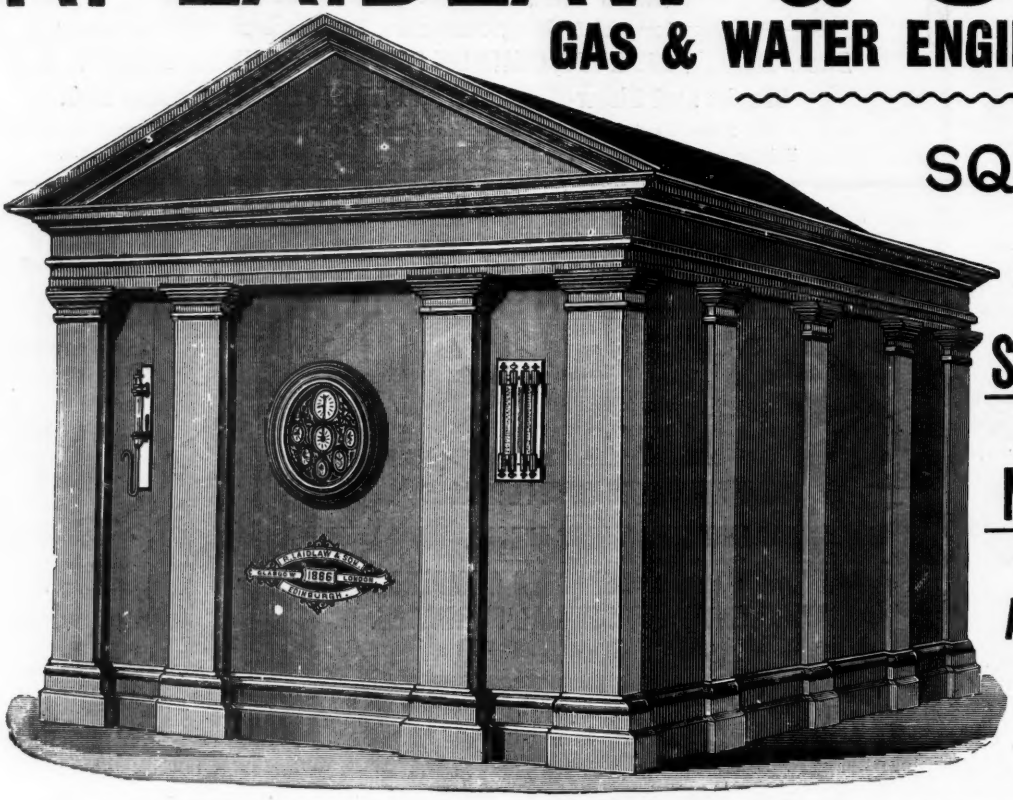

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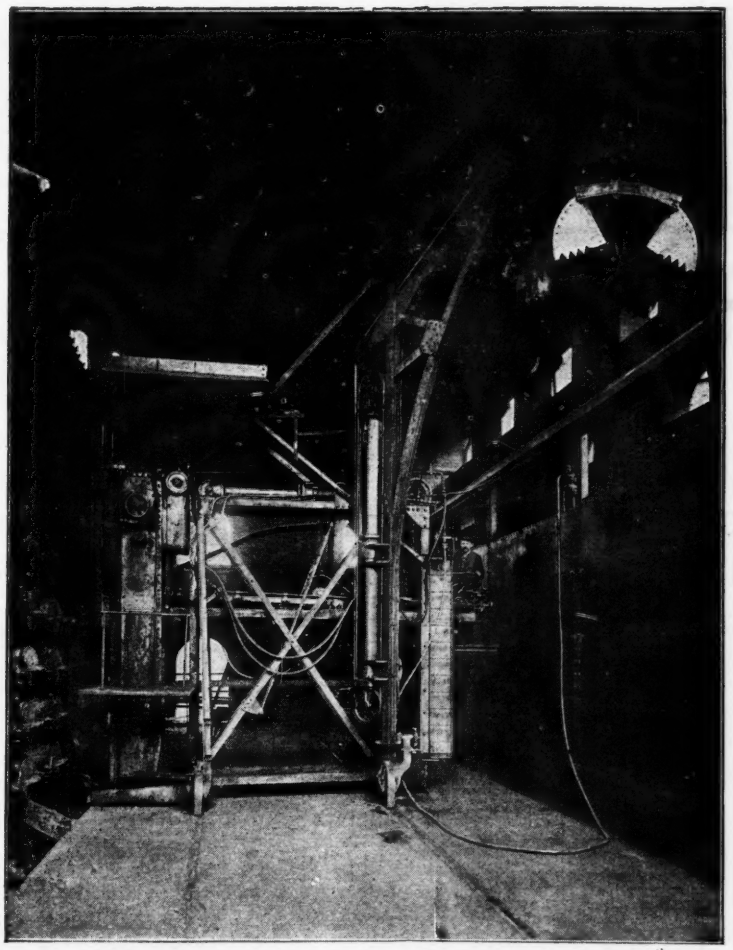

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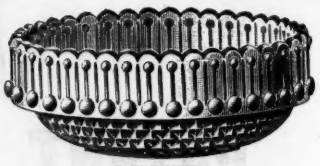

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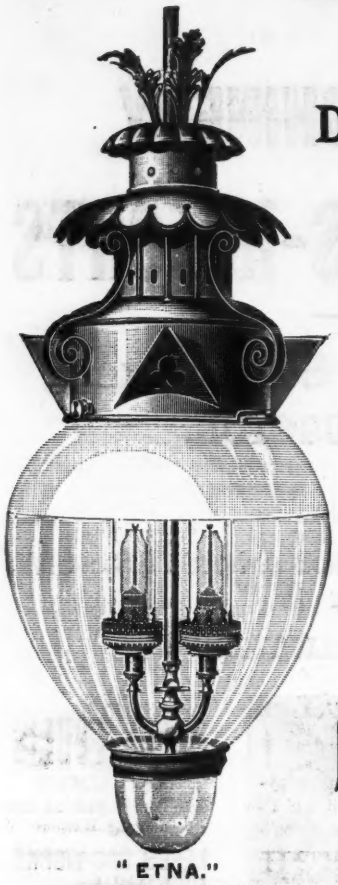

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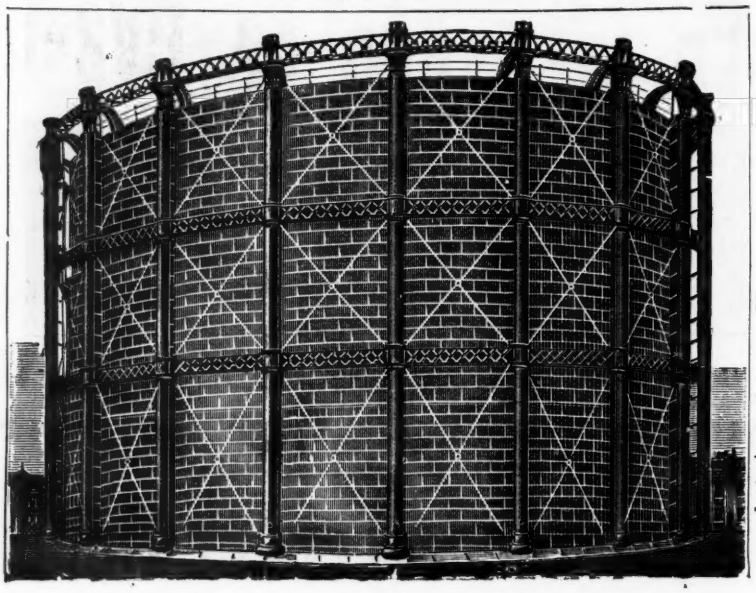

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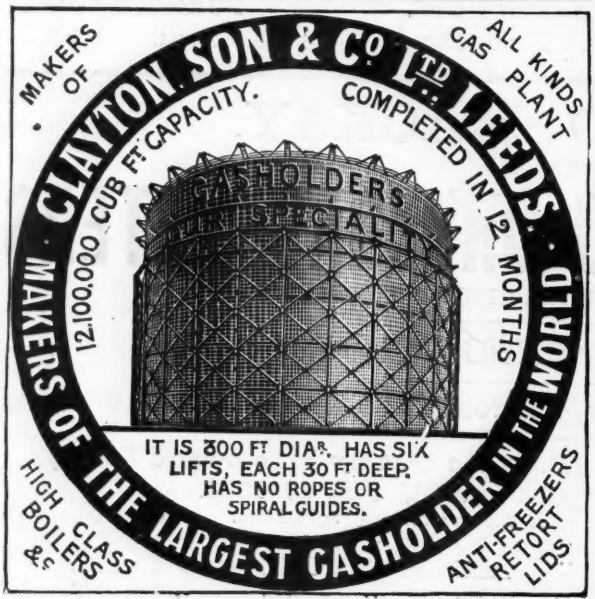
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